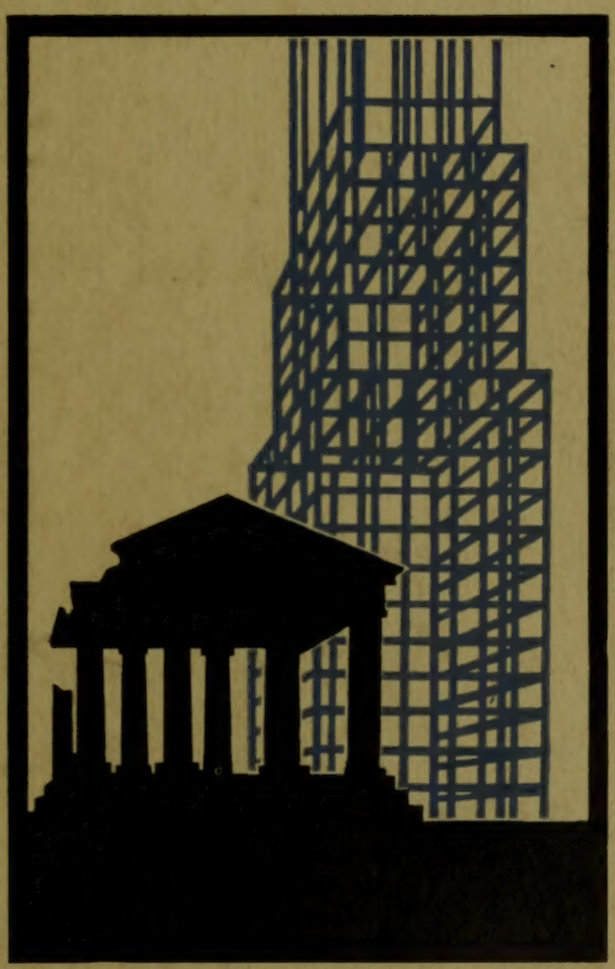
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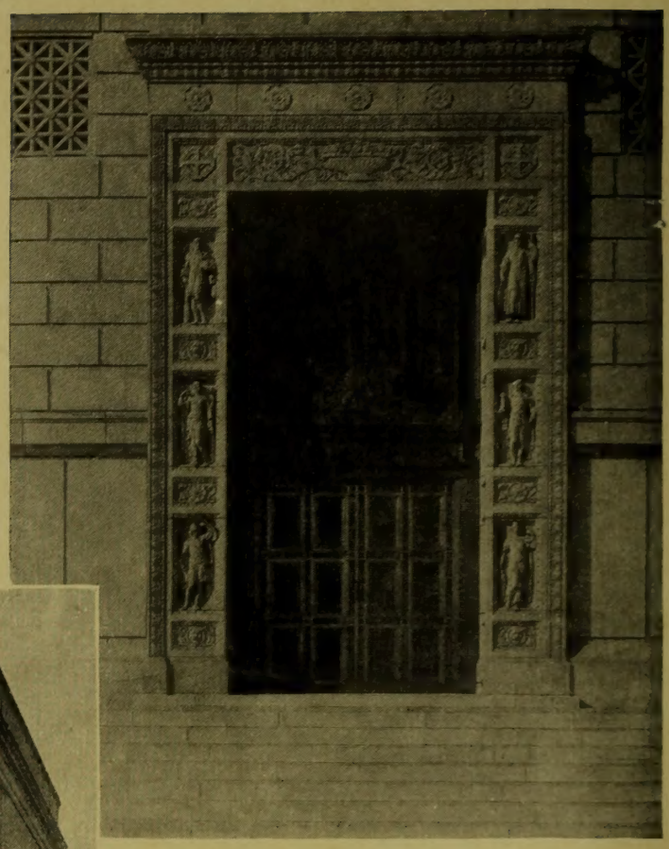
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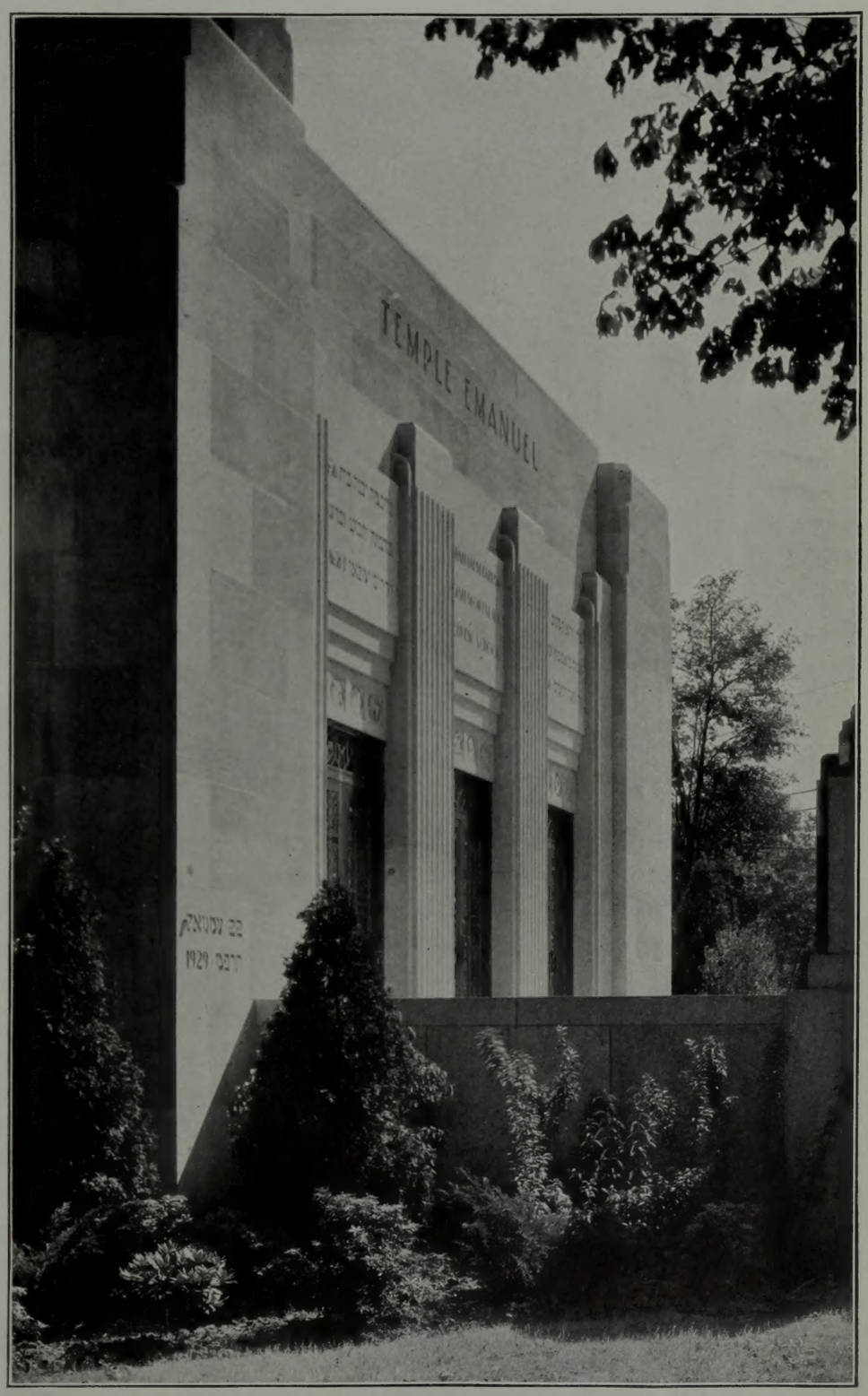
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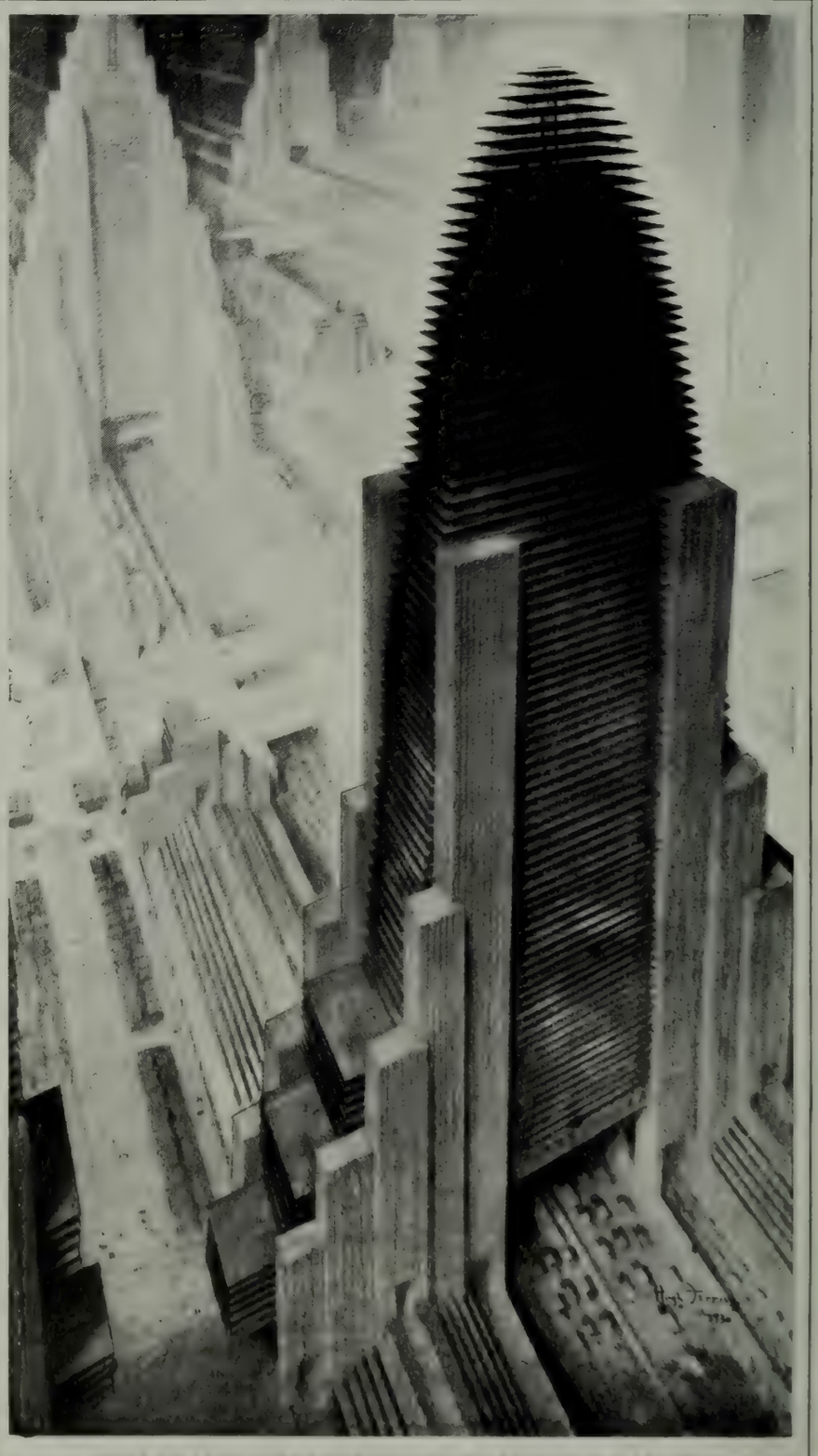
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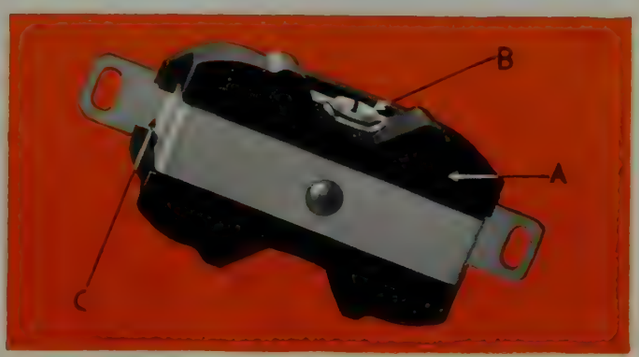
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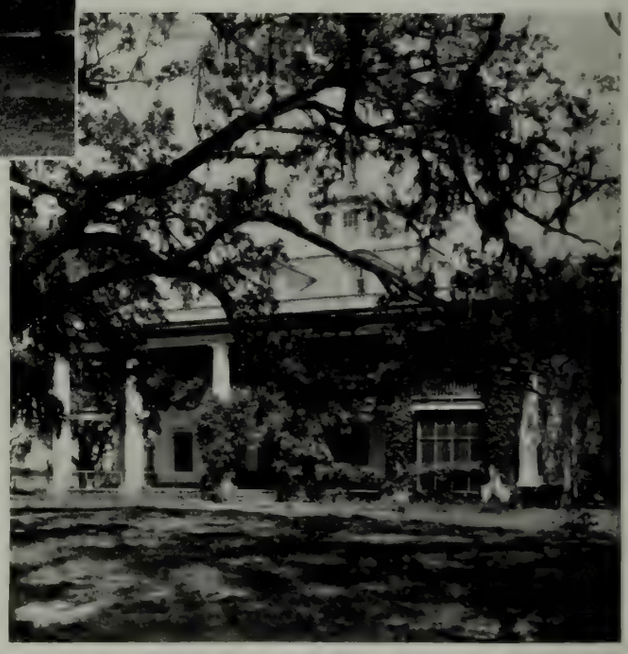
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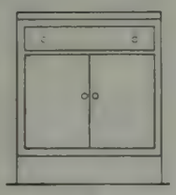
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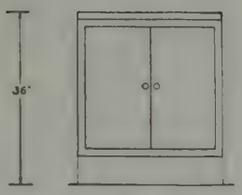
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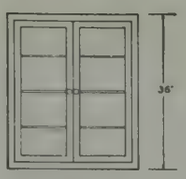
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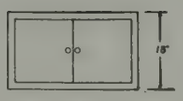
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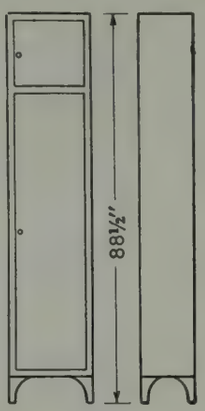
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WHERE, formerly, the basement was wholly utilitarian in its use and unlovely in its physical appearance, in the modern home it represents a very considerable addition to the "livable area" of the house, demanding decorative treatment and furnishings on a par with the upper floors.

From the architectural point of view this new area possesses peculiarly fascinating possibilities.

Because it is new territory, not yet restricted by rigid conventions, and because it is so largely used as a play-ground, the architect is almost always allowed to give his creative imagination free rein.

More liberal use of color, informal or unusual materials, modernistic details, whimsicalities suggestive of a carnival spirit—all these are finding appropriate application in modern livable basements.

The greatest single stimulus to the development of livable basements is gas heating — absolutely clean, quiet and odorless, requiring no fuel storage, bringing no dirt into the house and creating none. In addition, the Model 45 Bryant Boiler supplies a heating plant which, without partitions or screenings, is a handsome and harmonious part of a decorative ensemble.

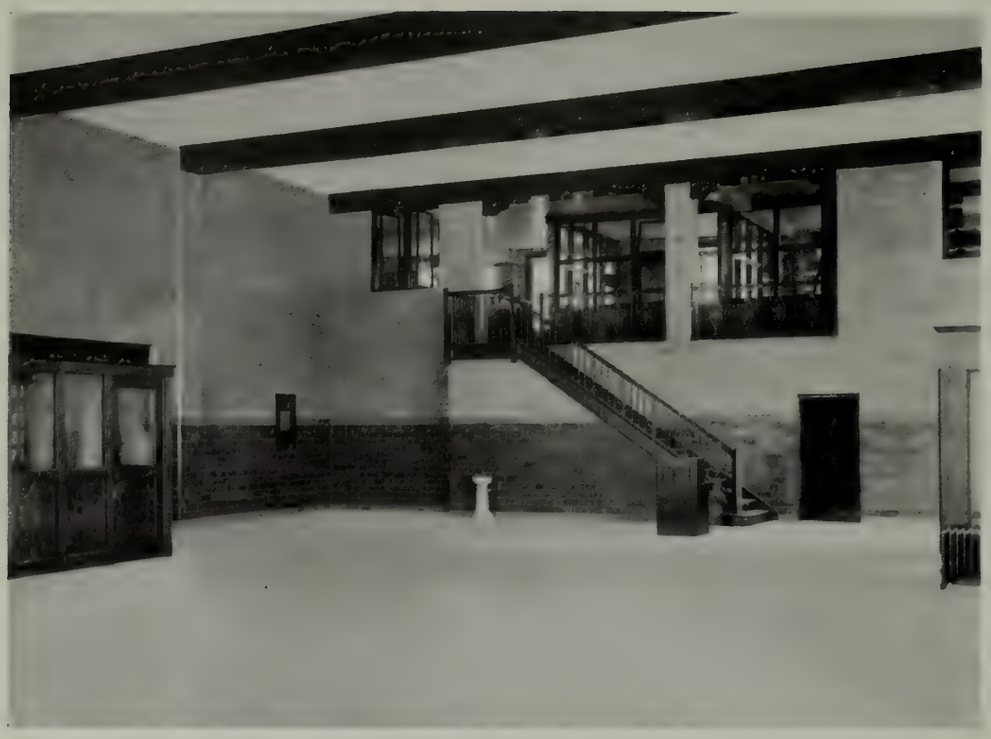
BRYANT GAS HEATING



THE BRYANT HEATER & MANUFACTURING COMPANY
17819 St. Clair Avenue :: Cleveland, Ohio

Descriptive literature and color plates of livable basements gladly submitted on request.

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Showing the installation of AR-KE-TEX Tile in the new International Harvester Company Building, Philadelphia, Pa.

and

A Structural Unit With an Attractive, Finished Face

THE development of AR-KE-TEX as the first structural wall tile to combine beauty, permanency and economy has been rapid and continuous. First came Insul-Glaz, a salt glaze tile—next Caentile, a further development, in a smooth, unglazed, but thoroughly impervious tile, then another refinement, Mottled Tile. This continuous improvement and development, coupled with widespread satisfaction in use, has gained for AR-KE-TEX Tile nation-wide acceptance—as THE STANDARD OF TEXTURED TILE.

Beautiful Walls That Never Need Painting

In addition to making possible new and unusual wall effects, AR-KE-TEX Tile makes a wall of lasting beauty that never needs painting. Its thoroughly vitrified face in any finish stays *permanently beautiful.* And that's important because it means tremendous savings in maintenance costs which continue for the life of the building.

AR-KE-TEX
ART-KERAMIC-TEXTURES
CLAY PRODUCTS COMPANY, Inc. of INDIANA
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NOW

The latest creation by Clay Products Company, Inc. of Indiana

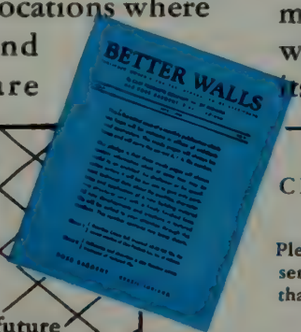


Cream Buff
STIPPLED
AR-KE-TEX TILE

IN announcing this newest creation—Cream Buff STIPPLED, Clay Products Company, Inc. introduces a color blend adaptable to a wider range of architectural and decorative effects than any other shade ever developed. Color preferences for both exterior and interior walls in all classes of buildings were studied and Cream Buff STIPPLED proved the answer.

This new finish is ideal in locations where correct light diffusion and close, even shading are important. Cream Buff STIPPLED like all other finishes of AR-KE-TEX Tile is impervious to the action of oils, greases, acids or alkalis. It cleans easily with soap and water and no painting or decorating is ever necessary.

In schools and all public buildings, industrial buildings and residences where a sanitary, easily cleaned finish is desirable, Cream Buff STIPPLED AR-KE-TEX Tile is ideal. See this newest development in textured tile. The coupon below will bring you some pertinent data on its many adaptations.



Get This Monthly Brochure on Textured Tile

This interesting brochure, Better Walls, issued monthly, will bring you instructive information on future new developments on AR-KE-TEX Tile. We will be pleased to place you on our mailing list.

CLAY PRODUCTS COMPANY, INC. *of* INDIANA
Brazil, Indiana

Please place me on your list to receive the brochure, Better Walls. Also send me the name of the AR-KE-TEX Tile distributor in my vicinity so that I may receive samples.

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*Address*_____

*City*_____ [AR]



This is a hand-laid floor of Armstrong's Linotile in the billiard room of the Keystone Athletic Club, Pittsburgh, Pa. Twelve-inch blocks of Tourmaline and Matrix were laid on the diagonal, with a dark border.

Can Club Floors capture home atmosphere?

Modern interior decoration helps to catch that domestic note with interesting furnishings and furniture—and a hand-laid Armstrong floor for every room

CLUBS are multi-roomed. There is the lounge, the dining-room, the library. Then, too, the billiard and card rooms, the barber shop, and locker rooms. Small rooms, large rooms. Rooms that are restful and beautiful, rooms that combine beauty with utility. For each interior, there is a custom-tailored floor of Armstrong's Linotile in keeping with its decoration, its specific use.

When the architect creates a floor of hand-laid Linotile, he is able to match any color scheme, harmonize it with any interior. His club design captures that personal, intimate note of the home. His imagination is free to work with thirty colors in a score of variously sized tiles. His floor will provide the proper setting for the decorative motif.

As in clubs, so in schools, hotels, public and semi-public buildings—wherever a floor of warmth, quiet, and beauty is desirable. Armstrong's Linotile is the solution for the multi-room problem. And in addition to its adaptability to interior design, there are its very practical qualities—foot-comfort, ease of cleaning, and permanence. A lifetime of service and good looks.

We suggest that you send for our illustrated book, "Custom-Built Floors of Cork." It gives you complete information about Linotile and Cork Tile, another hand-laid Armstrong Floor, with views of some unusually fine installations. We'll gladly send you this book without charge or obligation. Just drop a request to the Armstrong Cork Company, Custom Floors Department, Lancaster, Pennsylvania.

Armstrong's (A) Product



Cleanliness, quiet, and comfort are in this Armstrong's Linotile Floor, custom-laid in the Keystone Athletic Club's barber shop in Pittsburgh.

Armstrong's Custom Floors

LINOTILE **CORK TILE**

MADE BY THE MAKERS OF ARMSTRONG'S LINOLEUM



—and Junior adds the final touch. He knows—he feels instinctively—that his father's office is a true reflection of his Dad—friendly—pleasant—hospitable.

And the reason Dad's office is so truly reflective is because of the Leopold furniture, mastercrafted for American executives who appreciate inspiration, beauty, and quiet refinement in their offices.

Leopold office furniture is furniture at its best. It's authentic, naturally, for Leopold has gone to the old masters for the designs. It is quality, for Leopold uses only the finest woods—perfectly matched. Its atmosphere is perfect—for each piece is designed to be a part of the complete ensemble.

Your office—really your home for the greater part of your time, the place you live every day—can reflect you at your best when it is equipped with Leopold furniture.

If you would like to have such an office, write for plans of office decoration. There are unlimited combinations from which to choose—one of which will be typically you. The Suite shown is the Jacobean, made by The Leopold Company, Burlington, Iowa. Makers of fine furniture since 1873.

Berrycraft HOUSE PAINT A sensation

FIRST ANNOUNCEMENT BRINGS NEARLY 100 UNSOLICITED ACCOUNTS

BERRY BROTHERS' welcome announcement of a revolutionary new Lionoil-processed house paint met with amazing response. Unsolicited — nearly 100 dealers took on the line and architects everywhere have requested further information.

Berrycraft House Paint is a typical Berry Brothers' finish — good-looking and long-lasting. It is the only house paint made with Lionoil — world-famous wood preservative and rust preventive.

We started out to make the best paint on the market — and we're doing it. The tremendous response accorded our first announcement is striking evidence of the need for this finish and of this company's sterling reputation.

Berrycraft is the biggest house paint value on the market today. It gives extra wear and beauty at an actual saving in cost. Tested under all conditions, it has proved its superiority.

Architects who specify Berrycraft House Paint are sure of getting a handsome, long-lasting finish at a reasonable price. Write our architectural department for details.

BERRY BROTHERS
Varnishes Enamels Lacquers

Detroit, Michigan *Walkerville, Ont.*

Modern

DAYLIGHTING
VENTILATION
ROOF CONSTRUCTION



[EDISON ELECTRIC APPLIANCE CO., CHICAGO]

Featherweight Concrete
INSULATING ROOF SLABS

The trend toward the light weight precast concrete roof-deck is as marked as the parallel developments in daylighting, ventilation and other elements of modern building design.

Made of Haydite aggregate *(trapped air cells)* instead of sand, Featherweight Concrete slabs *weigh as low as 10 lbs. per sq. ft.*, are strong and have new insulating value. They go on the same light steel frame that carries other roofs.

This roof-deck meets fully, today's requirements for a true investment in permanent, fireproof, no-maintenance roof service. Prominent architects and engineers are using Featherweight — for leaders in industry like Chrysler, International Harvester, Bendix Aviation, Dow Chemical, Grigsby-Grunow, Kelsey-Hayes Wheel — for railroads like the Milwaukee, St. Paul — for public buildings like the great new Detroit and Wayne County Hangars. New "Catalog and Roof Standards" sent on request.

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FEDERAL CEMENT TILE COMPANY

608 South Dearborn Street Chicago

FOR OVER A QUARTER CENTURY



BEDROOM BY JACQUES SCHNIER. NOTICE LOVELY GRAIN OF HIS PHILIPPINE LAMINEX DOOR

Philippine Laminex doors in stock designs are now available in nearly every city. Newest of a famous line (won't shrink, swell, or warp), these beautiful hardwood doors have won us more compliments from architects than any we have ever before produced. Write for complete information, or for Philippine Laminex quotations on your own plans and specifications. And for copy of our new Manual, return the coupon.

THE WHEELER, OSGOOD COMPANY, DEPT. G160, TACOMA, WASHINGTON: SEND ME MANUAL

NAME..... FIRM

ADDRESS..... CITY

Paul Revere

wrote it!

"THE LETTER THAT STARTED AN INDUSTRY"

Boston, Dec. 31 1798

Sir:

I understand you have advised the Committee for building the Frigate in Boston not to send abroad for anything they can get manufactured in this country; those Sentiments have induced me to trouble you with this letter. I can manufacture old or new Copper into Bolts, Spikes, Staples, Nails, etc., or anything that is wanted in Shipbuilding; that is cast of Copper into pigs, draw the pigs into Barrs under the Forge hammer and then manufacture the Barrs into Bolts, Spikes, Nails, etc., etc. I supplied the Constitution with Dovetails, Staples, Nails, etc., etc.*

My greatest difficulty is to get Copper. Could I get a sufficient supply of Copper, I would undertake to roll Sheet Copper for sheathing ships, etc.

I have been induced to trouble you knowing that you are at the head of a department where you have the best means of knowing the resources of the country and your willingness to communicate anything that may be for the public good.

You will permit me to offer my services to you in Manufacturing Brass Cannon, Bells, Copper Bolts, Spikes, etc., etc.

I am, sir, with every sentiment of esteem

Your hum. Servt.

Paul Revere

BENJAMIN STODDARD ESQ.
Naval Secretary at Philadelphia

* *Historic U. S. frigate, later sheathed with Revere sheet copper.*

23 YEARS after his midnight ride, Paul Revere wrote this letter to sound another call,—that of the urgent need for an American copper industry. What it started is strikingly pictured in the contrast between the original Revere business and the Revere business of today.

For his raw material, Paul Revere had to buy, beg or barter every scrap of old copper that came within his reach. Today, scientifically refined ingots, cakes and billets of pure copper flow into Revere plants in a never-ending stream.

Paul Revere shipped via sloops, schooners, and ox-teams. Revere today has seven plants in five major industrial centers, located for on-the-spot service to the Atlantic States, the Middle West, New England, the South and West.

SINCE 1798 . . .

American industry has gone from a log-fire, husky-right-arm stage to an automatic-furnace, electric-control stage. The name Revere stood for copper and brass leadership then. Today Revere operates 25% of the country's copper, brass and bronze rolling-mill facilities, including the two largest copper mills.

Revere Copper *and* Brass

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Stanwin Casements Oliver Cromwell Hotel, New York City, Emery Roth, Architect

THE OLIVER CROMWELL HOTEL— EQUIPPED WITH MODERN WINDOWS BY CRITTALL

Representative of the modern trend in hotel window treatment, the Oliver Cromwell Hotel in New York City, is equipped throughout with Crittall Casements.

For this type of architecture, Crittall Casements offer many advantages. They add to the comfort of the hotel's guests by providing maximum light and ventilation, together with complete weather protection. And—because they are permanently free from sticking and rattling, and are easy to clean and screen—they reduce maintenance costs to a minimum.

The beauty and utility of Crittall Casements can be incorporated in all of your projects to the advantage of your clients. The three Crittall lines provide casements suited to every window requirement.

Stanwin Casements in standard sizes are available at competitive prices. Norman Casements offer windows of highest quality in a wide range of standardized types, designs, and sizes. Universal Casements are custom-built in bronze or steel to your most exacting specifications.



Stanwin Casements are available with screens by Crittall

You will find our complete catalog in Sweet's, pages A1131-A1200, and upon request, we will gladly supply you with separate copies for use in your drafting rooms.

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IN COLOR! Connectaphone is the first to depart from the ordinary, unattractive black box phone with exposed bells.

Connectaphone is now made in modern, attractive design. Rich brown standard finish; other colors to order. The time-tried, voice-transmitting units—the result of 36 years of Connecticut research—are beautifully adapted to the new molded Bakelite case.

Clients appreciate the thoughtfulness of architects who specify CONNECTICUT CONNECTAPHONE. Your files should include literature on this equipment.

Write for the latest.



Cordless Vestibule Phone and mail box combination. An original Connecticut development—a vestibule partner for the Connectaphone



Connectaphone—a product of experience. Harmonizes with the finish of modern homes, apartments or offices

Increased activity in rapidly expanding markets has made it necessary to increase the number of our representatives. Sales Engineers, experienced in this or similar lines, are invited to write. If your territory is open, this may mean a valuable connection.

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In the finest buildings *the windows* are usually Lupton

THE STRUCTURE that dominates the landscape at Lincoln, Nebraska, is a fitting capitol for a great state. Indeed, it has drawn the attention of the architects of the nation as one of the really noteworthy monumental buildings of the past decade.

The dignity and impressiveness of the Nebraska State Capitol Building is heightened by the use of Lupton Heavy Casements. These famous windows have earned the highest endorsement of architects everywhere. You will find them installed in the leading buildings of the country.

Each Lupton Heavy Casement is an individual job. Each is fabricated into the finished product by our most skilled workmen. At their disposal are the finest of tools and materials. Their craftsmanship is checked by exacting supervisors. For Lupton believes in building windows to last more than one generation.

Complete information on Lupton Heavy Casements can be found in your current edition of *Sweet's*. David Lupton's Sons Company, 2209 E. Allegheny Avenue, Philadelphia, Pa.

LUPTON

where steel is fused with sincerity





How to Win a Prize*

FIRST, design a house as beautiful as this,—appropriate to its setting, sympathetic and homelike in mass and detail, fitted to its use.

THEN, finish its exterior walls with Cabot's DOUBLE-WHITE, a brilliantly *white* white that stays white, because it is made by the patented Cabot Collopaking Process. There is no other white just like Cabot's DOUBLE-WHITE.

INSULATE and protect against summer heat and winter cold with Cabot's Insulating Quilt,—the health-giving, time-tested, time-defying and low-priced insulating material.

USE Cabot's Collopakes on exterior trim, doors and shutters, and on interior walls. Waterproof with Cabot's Waterproofings, Stain with Cabot's Creosote Shingle and Wood Stains.

*This beautiful house, designed by Barber & McMurry, Knoxville, Tenn. for Hugh Goforth, Esq., was awarded the Tebbs & Knell Gold Medal at the Southern Architectural & Industrial Arts Exposition, Memphis, 1929.

The Architects state in a letter recently received," Cabot's DOUBLE-WHITE was used for the entire exterior of this job, three coats, and has proven to be entirely satisfactory. Cabot's three-ply insulating Quilt was also used on all side walls and sloping portions of ceilings. Incidentally, we find that Cabot's Quilt is a very effective and economical material as compared to other similar products."

Send in the coupon below for complete information on

Cabot's

Insulating Quilt - DOUBLE-WHITE

Collopakes and Other Building Specialties

COUPON

Gentlemen: **Please send me your Building Specialties Booklet.**

Samuel Cabot Inc.

141 Milk Street, Boston, Mass.

Name

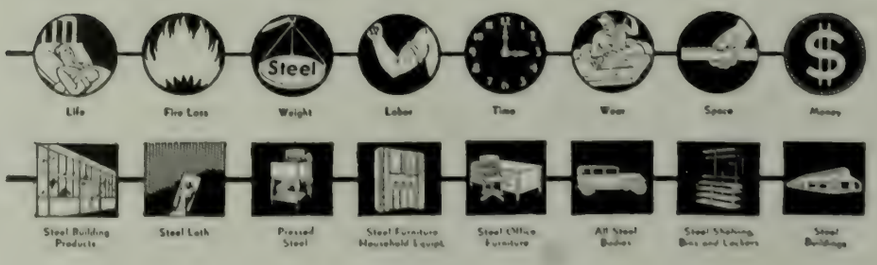
Address A. R. 4-30

Save-



and

Save with Steel



Build Now — but with the PERMANENCE of STEEL



GOVERNMENT officials and commercial groups are today urging every progressive American to build this year those structures which are needed. This suggestion, sponsored by the nation's best informed men is no hurried gesture. It arises from the definite conviction that *now* is the *advantageous time* to build.

But greater care must be exercised in the selection of building materials. Obsolescence has come too quickly. Repairs have been needed too soon. These two factors alone are costing American building owners $900,000,000 a year. Structures which definitely fight off time; that recognize no early obsolescence; that require little upkeep and repair are the present need. This applies to homes, industrial, public and commercial buildings.

Steel building products fill this need.

Take steel doors, panelling and trim, for example. These products arrive already to erect. No warping, sagging, shrinking or cracking can take place. The doors go up quickly—fit perfectly. The trim snaps into place with absolute precision. As a result, the building is finished many weeks ahead of the usual time.

But better still, no noisy, dirty, expensive refitting is ever required. The beautiful baked-on finishes—or those applied on the job—remain fresh; unmarred for years. One dollar per year per door is often saved in revarnishing expense alone. Cleaning costs are halved—no scrubbing—a dry cloth takes off the dust. Tenants stay, for their space remains beautifully modern.

—And in office and industrial use, the steel partition is gaining rapidly. With all the advantages of a permanent, easily cleaned finish; these partitions can be erected or moved easily and speedily without interfering with the employees—without the dirt and expense of re-plastering and re-finishing. Lost rent, lost hours and lost money are saved.

. . . and Steel Never Starts a Fire or Feeds the Flames

Build now—but build profitably with the permanence of steel. For wherever steel is used, it makes certain definite savings. In one case it may be weight, in another time or fire loss, life, space, labor, dirt, money. But the proof that these savings are real is found in the constant development of new steel building products and rapid increase in use of the following well known ones:

Bins
Buildings (Standard Steel)
Ceilings
Cornices
Delivery Chutes
Display Fixtures
Doors (Office, Home, Elevator, Fire)
Dryers (Laundry)
Eaves Trough
Elevator Enclosures
Forms (Floor)
Joists (Strip)
Lath
Lockers
Marquise
Medicine Cabinets
Panelling
Partitions (Office, Toilet, Shower)
Radiator Enclosures
Roof Decks
Roofing
Shelving
Siding
Skylights
Stacks
Stairways
Tile (Wall)
Trays (Laundry)
Trim (Baseboards, Chair Rails, Moulding)
Ventilating Ducts
Ventilators
Window Trim

Full information on any steel building product will be supplied by

Trade Research Division—National Association
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511 Terminal Tower Building,
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beautify with Steel

Doors - Trim - Panels - Partitions

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GRAHAM, ANDERSON, PROBST, & WHITE, ARCHITECTS

IMPERVIOUS TO MOISTURE

Georgia Marble stands up under the most severe climatic changes because the destructive forces of the weather cannot penetrate below the surface. Architects, who have used Georgia Marble for their important buildings, are well pleased with the material and service rendered.

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NEW YORK	ATLANTA	CHICAGO	DALLAS	CLEVELAND



Main entrance door to Gulf Research Laboratory Building at Craft Avenue and Emily Street, Pittsburgh, Pa. Architects, Schwab, Palmgreen and Merrick of Pittsburgh. General Contractors, Mellon Stuart Company. Main entrance doors fabricated by Newman Manufacturing Company, Cincinnati, Ohio.

Alcoa Aluminum used for spandrels, window mullions, cover mouldings for windows, and main entrance door. For details see next two pages.

ALCOA ALUMINUM

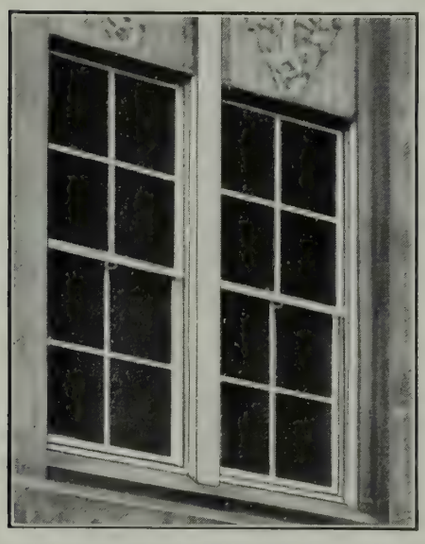
USED IN 3 DIFFERENT WAYS FOR



There are 48 spandrels cast in two general sizes, from No. 43 alloy. The total weight of these spandrels is 3280 pounds.

CAST

Spandrels of two different types, cast of Alcoa No. 43 Aluminum Alloy, decorate the face of the Gulf Research Laboratory. Without staining, tarnishing or cracking, these spandrels will last as long as the building. They never need to be painted. They are uncoated and are made of a light, strong Alcoa Aluminum Alloy. Their weight is about one-third that of iron or bronze spandrels of equal size. Thus they are easier to fabricate, handle and erect. In addition, shapes made of Alcoa Aluminum Alloys can be fitted into stone work easily.



The window cover mouldings are made of extruded aluminum. A total weight of 1105 pounds. The window mullions are also made of extruded aluminum. Total weight 960 pounds.

EXTRUDED

Thanks to the fact that Alcoa Aluminum Alloys can be readily extruded, they are proving a valuable material for decorative uses on many buildings. On the Gulf Research Laboratory, for instance, all the window mullions and cover mouldings for windows are of extruded Alcoa Aluminum Alloy. Light in weight, unaffected by the weather, not even requiring the protection of paint, Alcoa Aluminum Alloys have many distinct advantages to recommend them for these and other architectural purposes.



The main entrance doors were fabricated from Alcoa Aluminum and both extruded shapes and plate were used.

FABRICATED

The main entrance doors of this building are fabricated from Alcoa Aluminum in the form of plate and extruded shapes. The use of fabricated Alcoa Aluminum is steadily increasing. More and more architects are recog-

ALCOA

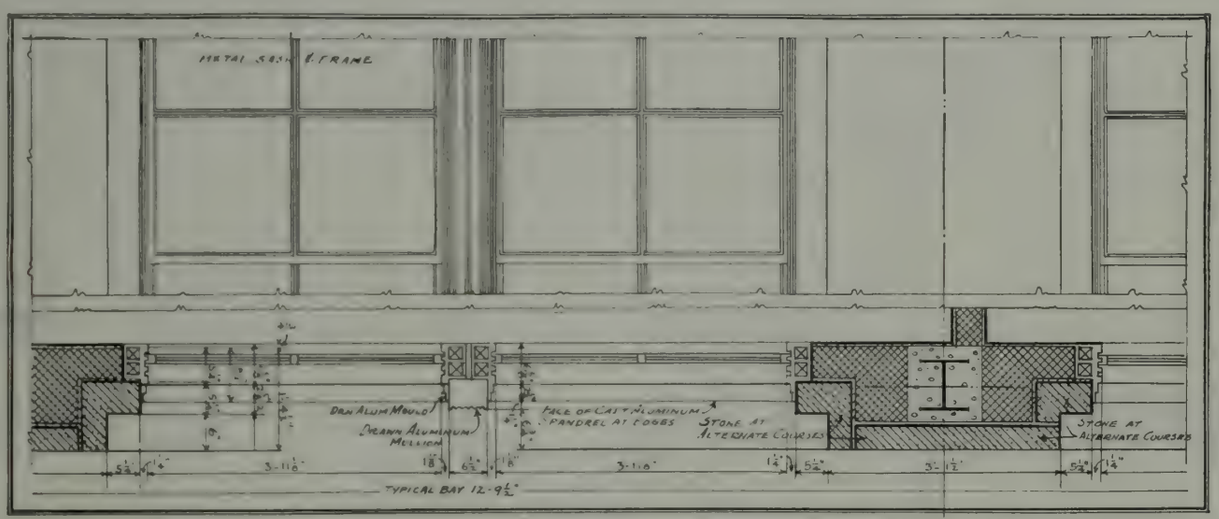
GULF RESEARCH LABORATORY

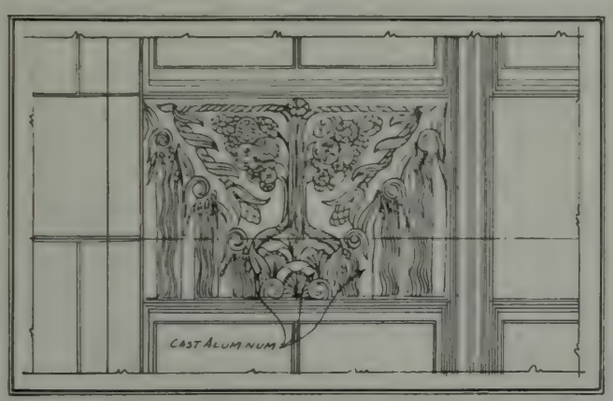
nizing the unusual decorative and other qualities of Alcoa Aluminum.

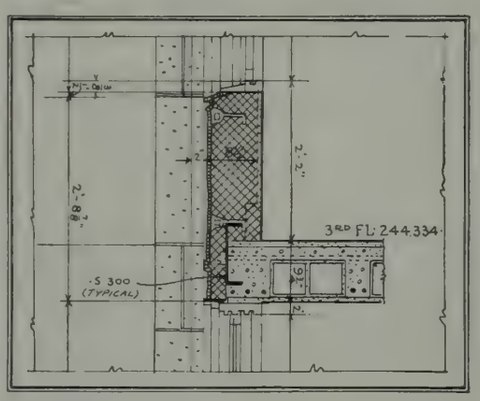
May we send you our booklet, "Architectural Aluminum"? It shows where Alcoa Aluminum has been used, and why it was used. This booklet may suggest some interesting ideas to you. ALUMINUM COMPANY *of* AMERICA; 2467 Oliver Building, PITTSBURGH, PENNSYLVANIA.

SPECIFICATIONS

"These aluminum spandrels, sills and other cast items shall be made of Alcoa No. 43 alloy, having a silicon content of 5%. The average tensile strength shall be 17,000 lbs. per sq. inch and the average elongation in two inches 5%. The weight shall not exceed .097 lbs. per cubic inch. The surface shall be free from imperfections and in all respects equal to sample submitted."







ALUMINUM

ALCOA ALUMINUM

Sargent's New Door Closer

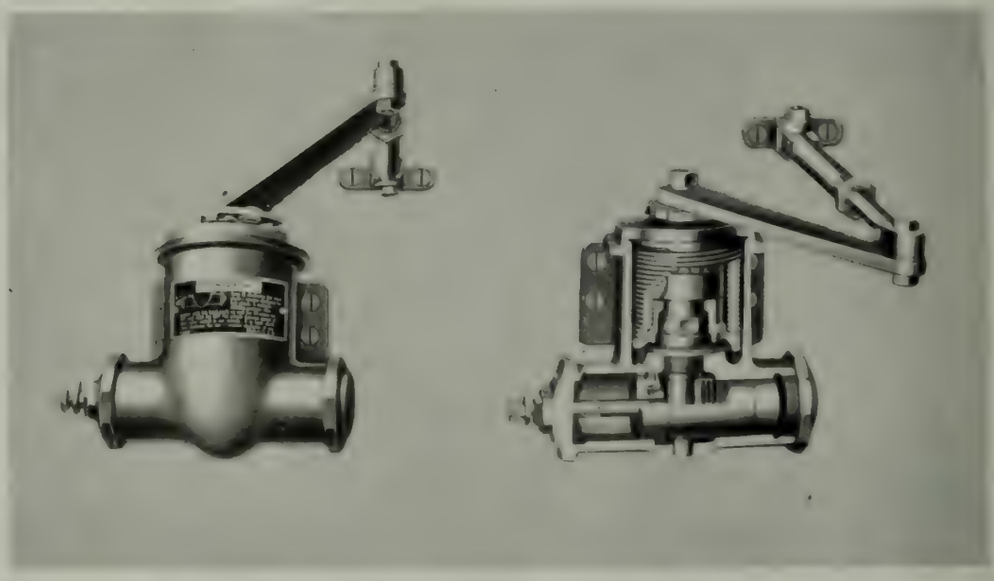
with all those features needed in the most modern buildings

SARGENT DOOR CLOSERS have been recognized for many years as standards of quality, dependable in effective operation. Now, to meet the latest requirements of the most progressive architects, engineers, building managers, owners, Sargent offers a new modern Door Closer or Controller.

Extensive research and experiment have resulted in the noiseless and complete control of the closing of any swinging door at the desired rate of speed. This new Sargent Door Closer is made in sizes suitable for all doors, from the simple passage dwelling door to the heavy entrance doors of the most modern commercial structures.

The control valve, of dual type, may be set for any one of three control points, 90, 45, or 10 degrees. The speed valve regulates the speed of closing and can be readily adjusted for changing draft conditions. This Door Closer offers the greatest possibilities of control. In order that the door may not strike against a wall or a piece of furniture, a valve is provided to stop the opening at about 90 degrees.

This Door Closer is reversible, right or left hand, without changing any of its parts and without affecting any of its other efficient features. Each Sargent Door Closer is packed in a strong fiber box without excelsior or other loose packing. To make application and adjustment simple, a template and complete directions are packed with each Closer. Read the other feature points as listed. Sargent & Company, New Haven, Connecticut; 94 Centre Street, New York City; 150 North Wacker Drive (at Randolph), Chicago, Illinois.



1 CASE—Spring and piston chamber in relative size give a pleasing, symmetrical appearance. The back plate is cast solid with the case. No screws to work loose. No undue strain on any one part.

2 SPRINGS—Highly tempered manganese carbon steel wire, wound in a helical coil. From 130″ in length for the smallest size to 184″ for the largest. Great elasticity, with fine graduations of power adjustment are obtained.

3 PISTON—Of cast metal of high tensile strength. Of the Rack and Pinion type, giving a balanced wear and a continuous travel when the door is in motion. The piston is always in constant control. Of large diameter, it is machined with the case to a tolerance of 1/1000 of an inch—smooth and effective operation is guaranteed.

4 ARMS—Of cold rolled steel without swivel adjustments. Adjustments can be made without loosening the arm from the Closer or removing the screws from the foot of the arm. Arms are of extra length—to permit Closer to be placed further from the butts, still allowing the door to open the full 180 degrees without strain.

5 HOLD OPEN DEVICE—A door may be held open at 10, 45, 90 or 180 degrees as convenience requires, and without strain on the Closer or butts. The pawl on the arm engages with projections on the cap of the Closer. All unusual requirements are met for hospital, school, booth, office doors.

6 SPINDLE AND PACKING—Spindle and pinion are in one piece of hot forged alloy steel. The spindle is strongly seated in a bearing in the bottom of the case and held in alignment at 4 points. The piston chamber has enough overflow space to relieve the spindle packing from excessive strain.

7 LIQUID—Piston chambers are filled with a liquid that long experience has proved most satisfactory.

8 BRACKETS—When desirable to place the Closer inside where doors open out, the usual soffit, flush and corner, hanging brackets, and also 4 convenient brackets for circular top doors are designed to care for a great range of varying conditions.

9 FINISH AND COLOR—Standard finish is dark, rich bronze to harmonize with various wood finishes. Other finishes can be furnished as desired.

SARGENT

LOCKS AND HARDWARE



Tribune Tower Building (extreme left edge)
333 North Michigan Avenue Building (left)
Carbide & Carbon Building (left center)
London Guarantee & Accident Building (right center)

PRATT & LAMBERT

VARNISH PRODUCTS

FOR many years to come the interior trim of the above notable group of buildings in Chicago will be beautified and protected by the use of "38" Preservative Varnish. This architectural finish is so durable that time seems only to enhance its inherent beauty.

"38" Preservative Varnish is valued because it is outstanding in appearance, durability and ease of application. Its fine natural gloss may be rubbed satiny dull or polished, as desired.

Call the nearest P&L Architectural Service Department for complete information on any finishing problem.

PRATT & LAMBERT-Inc., 108 Tonawanda Street, Buffalo, N.Y. (Phone Delaware 6000); 3301 38th Avenue, Long Island City, N.Y. (Phone Stillwell 5100); 320 West 26th Street, Chicago, Ill. (Phone Victory 1800). Canada: 28 Courtwright Street, Bridgeburg, Ont.

"Save the surface and you save all" Pratt & Lambert



"GOING PLACES"

when they should have stayed at their desks, producing

A "foot power" organization is not only an "old-fashioned" one; it is also an expensive one.

Yet "disorganized activity" is common in many business offices and industrial plants which are otherwise recognized as models of efficiency.

Men hurrying from desk to desk; boys carrying memoranda to executives; and executives dispatching stenographers to various departments with orders—all of which could be quickly and easily performed over Strowger P-A-X.

No project calling for interior telephone equipment will ever present this picture if Strowger P-A-X is specified. Employees will not be tempted to "go places". They will stay at their desks and produce.

Strowger P-A-X is made by the originators of the automatic telephone, and the largest exclusive manufacturers of dial equipment in the world. Moreover it is the only interior automatic telephone system that is built of the same type of apparatus that is used in public telephone exchanges throughout the country.

The Strowger P-A-X representative is a business telephone specialist. He is ready to serve you at any time you have need of him.

STROWGER AUTOMATIC DIAL SYSTEMS

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Engineered, Designed and Manufactured by

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In answer to the modern vogue for color, the popular Monophone, illustrated above, may now be had, not only in black, but also in a variety of beautiful colors. Made of solid colored synthetic resins with chromium or gold plated fittings.

SALES AND SERVICE OFFICES—Los Angeles: Boston: Cleveland: St. Paul: New York: Atlanta: Detroit: Kansas City: Philadelphia
GENERAL EXPORT DISTRIBUTORS The Automatic Electric Company, Ltd., Chicago: *In Canada* Independent Sales & Engineering Company, Ltd., Vancouver: *In Australasia* Automatic Telephones, Ltd., Sidney: *In Japan* Automatic Telephones Ltd. of Japan, Tokyo.
ASSOCIATED COMPANIES American Electric Company, Inc., Chicago: International Automatic Telephone Company, Ltd., London: Automatic Telephone Manufacturing Company, Ltd., Liverpool: The New Antwerp Telephone & Electric Works, Antwerp



YELLOW

ORANGE

BRICK RED

BROWN

BLUE

VIOLET

By taking a few simple steps, you, too, can create a similar "oil treatment" in Higgins' Drawing Inks. Limited space prevents a description here, but a short outline as to how this ink painting was made will be sent to you upon request so that you may follow it with a subject of your own choosing.

"Techniques", an exhaustive, exquisitely printed treatise upon the subject of rendering in ink, contains the examples of many noteworthy exponents of this medium. Copies will be sent gratis to architects and all others mentioning this magazine.



Oil?...no, *INK!*

HERE is a traditional subject in a new and non-traditional medium and technique—a resemblance at once delightful and remarkable between a painting in oil and *this* painting in ink.

The most noteworthy and appreciable features of the oil painting, the broad, "painty" plastic quality and the heavy brush strokes are at once apparent—yet there has been *added* still another charming characteristic—*the brilliancy and transparency of drawing ink*—a unique advantage and superiority proffered only by this most versatile of all art media!

This new and non-traditional technique differs from tempera, watercolor and oil in that it *combines* the outstanding advantages of each—the smooth and easy application of tempera—the transparent brilliancy of watercolor and the weighty, waterproof and fadeproof qualities of oil.

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The McCray line is complete. There are models to meet every size and style requirement — for Hospitals, Hotels, Institutions, Clubs, Restaurants, Food Stores, Florist Shops, and Residences. Also, McCray builds to order and our engineers will prepare blueprints and specifications based upon your sketches, without obligation.

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LEE BURNS & EDWARD JAMES, ARCHITECTS
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Burns & James, in accord with other leading architects of America, find Rolscreens best suited for the screening of fine windows.

Rolscreens
TRADE MARK
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Rolscreen Representatives in all Principal Cities . . . See Sweets Catalog Volume B . . . Pages B 2742-46

Where two famous pioneer enterprises join hands

IT IS interesting to note that in the Fuller Building two pioneer enterprises join hands; the businesses founded by Mr. Fuller, whose Flatiron Building was the first skyscraper, and Mr. Dahlstrom, who devised and patented the first Hollow Metal Door. Both enterprises have continued to lead in their respective fields, notwithstanding the competition that the years have inevitably developed.

You may regard as significant, as do we, that our product finds a conspicuous place in the Fuller Building, skyscraper monument to George A. Fuller, father of the skyscraper. 456 Dahlstrom Hollow Metal Elevator Entrances insulate all floors against the progress of fire through the elevator shafts, and 675 Dahlstrom Hollow Metal Swing Doors similarly protect the entrances to the individual office suites.

It is a safe procedure and a logical one, to entrust the manufacture of Hollow Metal Doors and Trim to the firm that conceived and fostered it. Consult us at any time, on the equipment most suitable for the type of building you are contemplating. We will submit samples and color sketches without obligation of any sort.



IN THE Fuller Building, New York City, 456 Elevator Entrances and 675 Swing Doors are by Dahlstrom. In addition, Dahlstrom Standard Steel Partitions, Base and Cornice Mouldings, Dumb Waiter Units, and Special Doors with Vision Panels, etc., are installed. Architects: Walker & Gillette, New York City. Contractors: George A. Fuller Co., New York City.



DAHLSTROM METALLIC DOOR CO.

449 Buffalo Street, Jamestown, N. Y.

(Established 1904)

"NO BUILDING IS MORE FIREPROOF THAN ITS DOORS AND TRIM"—*DAHLSTROM*

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Dependable sash chain is an important item of equipment. American Sash Chain is giving satisfactory service in thousands of large buildings—it is trouble-proof. It bears the approval of the Investigating Committee of Architects and Engineers. The American Society for Testing Materials fully recognizes the superiority of *copper-bearing steel*, used exclusively in the manufacture of American Sash Chain.

. . . These are reasons why it is safe to specify American Sash Chain. Full particulars as to material, finish, sizes, etc., are available in handy booklet form. In case you are not familiar with American Sash Chain, write us. Address:

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William Van Alen, *Architect*
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AMERICAN SASH CHAIN

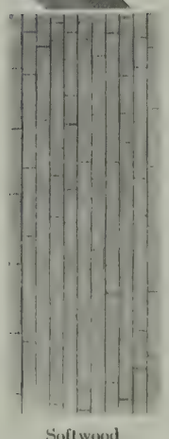


RODDIS FLUSH DOORS

The extreme of the most particularly desired door beauty and style is procurable in Roddis construction, as well as the conventional standard numbers catalogued by Roddis, and so widely used. For example, the door pictured at the left is of special pattern Australian Walnut; the door at the right is of Walnut with planted-on mould two sides, and divided ten lights. And both doors are of the completely solid five-ply Roddis construction illustrated and referred to below. The architect's specifications for special design are invited, assuring most satisfactory service and results.

RODDIS LUMBER & VENEER COMPANY
134 FOURTH STREET MARSHFIELD, WISCONSIN

Manufacturers Of Flush, French, Panel and Custom Made Doors
Distributors In All Principal Cities



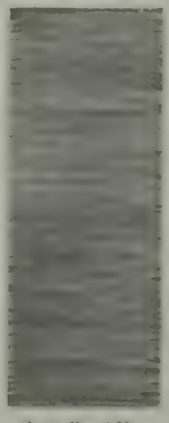
Softwood Core



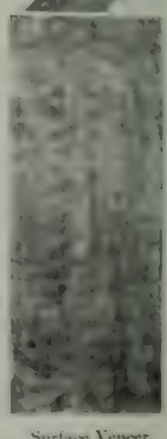
Edgestrip All Around

Roddis construction consists of a core of softwood; with a hardwood edgestrip on all four edges; a hardwood cross-band veneer on both sides; a finishing, or surface, veneer of hardwood on both sides: a 5-ply, completely solid door, cement glued under hydraulic pressure, thoroughly dried and moisture free. Each part shown here, with a structural view of the door complete.

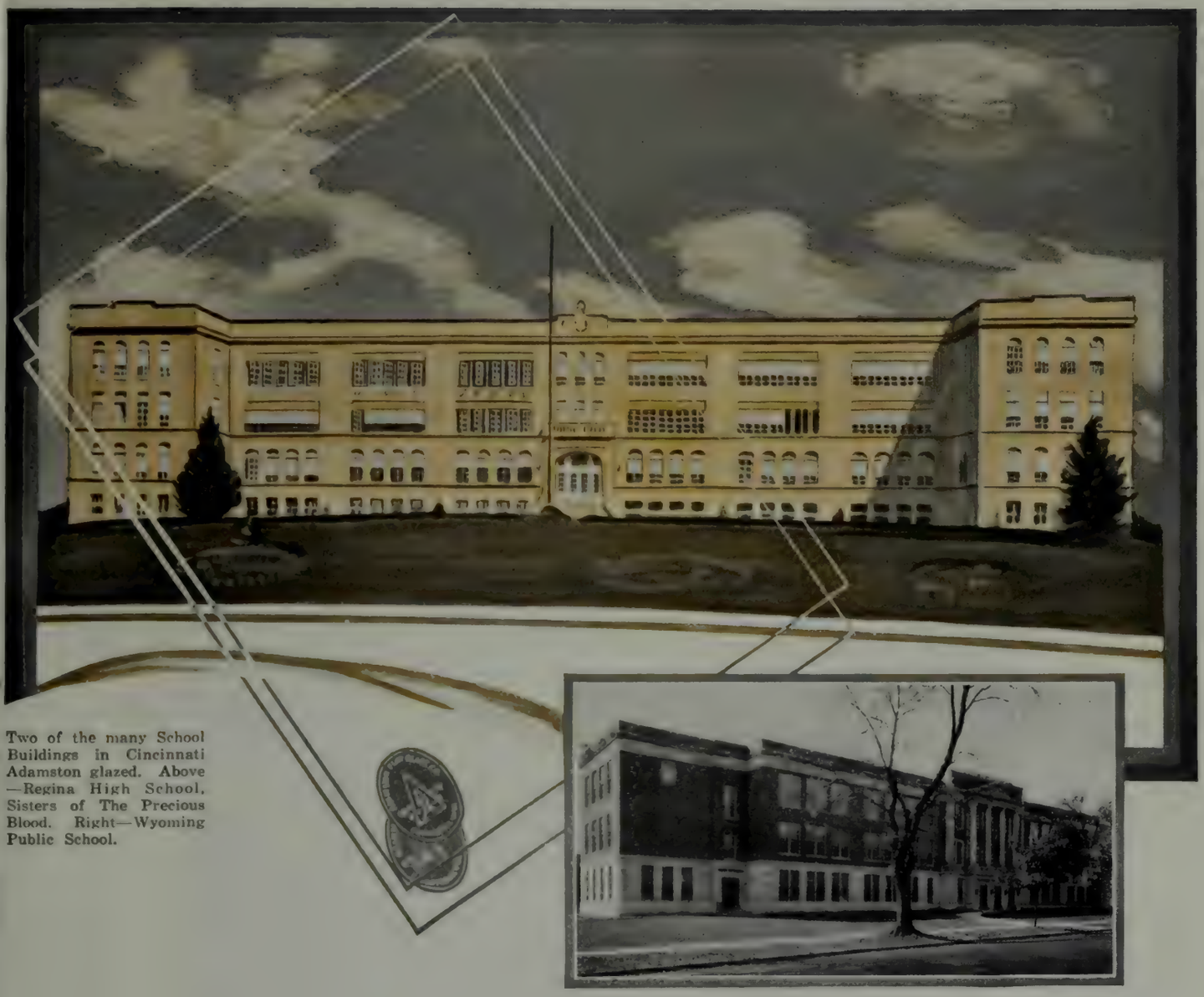




Cross-Band Veneer Both Sides



Surface Veneer Both Sides



Two of the many School Buildings in Cincinnati Adamston glazed. Above —Regina High School, Sisters of The Precious Blood. Right—Wyoming Public School.

Today--Specifications for School Buildings

call for a high standard of construction and a recognized quality of materials, and it is most significant that in the Glazing Specifications, there is an ever increasing demand for Adamston Window Glass.

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ADAMSTON FLAT GLASS COMPANY, CLARKSBURG, W. VA.

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HOTEL LINCOLN, *New York City.* SCHWARTZ & GROSS, *architects.* CHANIN CONSTRUCTION CO., *contractors.* A. RUBIN, *glazier.* "*A.W.G.CO.*" *Window Glass has increased the beauty of this building both inside and out . . . ornamenting the architectural design and bringing out the full charm of fine interior furnishings.*

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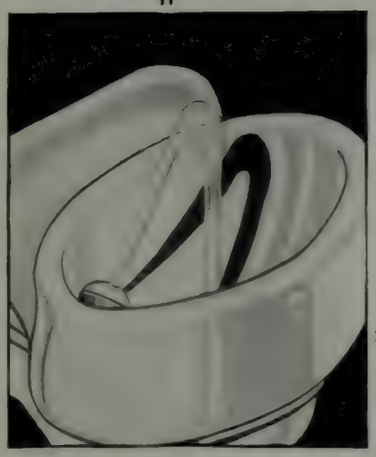
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3003

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Wall Fountains

Send for complete specifications of the new Century Fountains. Available in 7 colors and white.

It is changing all previous conceptions of Automatic Drinking Fountains. It gives a degree of efficiency heretofore unavailable. It eliminates . . . for the first time . . . the necessity of wasting water to hold the drinking stream constant.

HERE is truly automatic control of the drinking stream. Under tests the Century Development performed with this definite accuracy. With 5 pounds pressure the drinking stream was 1¾ inches high; with 45 pounds pressure it was 3½ inches high; and from 45 pounds pressure to 150 pounds pressure there was absolutely no variation in the drinking stream.

Wastes No Water

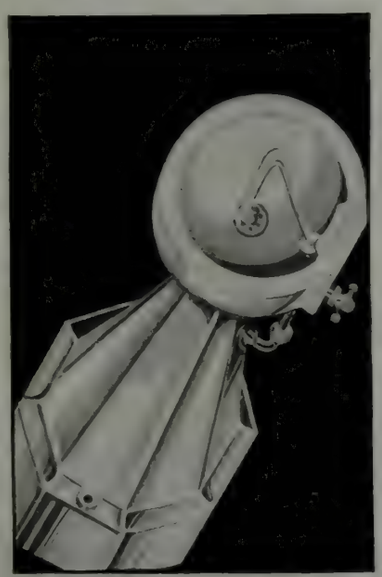
Not only does the Century Invention banish forever sudden splashing gushes and inconvenient, unsanitary trickles, but it does not waste a single drop of water. Realize what this means. Think of the actual savings in water costs, in cooling costs, and on refrigerating equipment.

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Learn now all the outstanding features of Century Fountains. See illustrations of the attractive 1930 line. The full story is contained in the new Century Catalog. Write for it today.

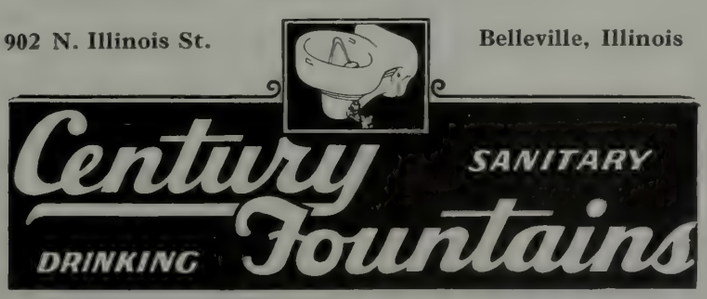
Pedestal Fountains

A complete line of Porcelain Pedestal Fountains in gleaming white or colors.



CENTURY BRASS WORKS, Inc.

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JM

PRODUCTS



Smith, Hinchman & Grylls, Architects

This elaborate ceiling design in the main banking room of the Union Trust Company of Detroit was applied over J-M Sound-absorbing Treatment without impairing its efficiency in the slightest degree.

Johns-Manville

ACOUSTICAL

TREATMENT

JOHNS-MANVILLE
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PRODUCTS

We have been privileged to aid in many acoustical problems . . .

IT HAS been our privilege to work with architects on the acoustics of a great many auditoriums built in this country during the past nineteen years. Similar problems are presented in large banking rooms and public spaces in nearly all types of buildings.

Our consulting work in the problem of applying acoustical materials to all classes of buildings has resulted in a wealth of experience which we place gladly at the disposal of architects, engineers and others having difficult or unusual conditions to meet in acoustical treatment.

Materials to suit all conditions

Johns-Manville offers a complete line of materials to meet all acoustical conditions. Its Architectural Service Department Representatives are equipped to serve you with expert knowledge and with intelligent appreciation of the architectural and decorative requirements to be preserved under any corrective treatment.

This same service is available to you in any desired application of the widely varied products of our manufacture which enter into the construction and equipment of buildings. We do not offer a service designed in any way to displace the architect or engineer in their respective fields but to support the efficiency of these professions by the consulting service of men trained to a sympathetic comprehension of their problems and with expert knowledge of our own products and general manufacture in corresponding lines.

Call upon us freely. No obligation attends any service we can render you.

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AUTHENTIC PLASTER ORNAMENT



The new JOHN DAVID Store

STARRETT & VAN VLECK, *Architects*

GRAND RAPIDS STORE EQUIPMENT CORP., *Designers*

Few landmarks were as familiar to New Yorkers as the old John David building at the south of Herald Square. Its four stories finally became inadequate to serve the needs of this ever-growing business, and rather than remodel, Mr. David decided to tear down the old structure and build a new one in its place.

The new building, with its atmosphere of dignified luxury, embodies today's recognized principles of store arrangement and design.

The plastering of the entire seven-story structure is the work of Jacobson & Company. In the private office of Mr. David pictured above, the geometric ceiling faithfully reproduced from the Bromley Palace design is unusually attractive.

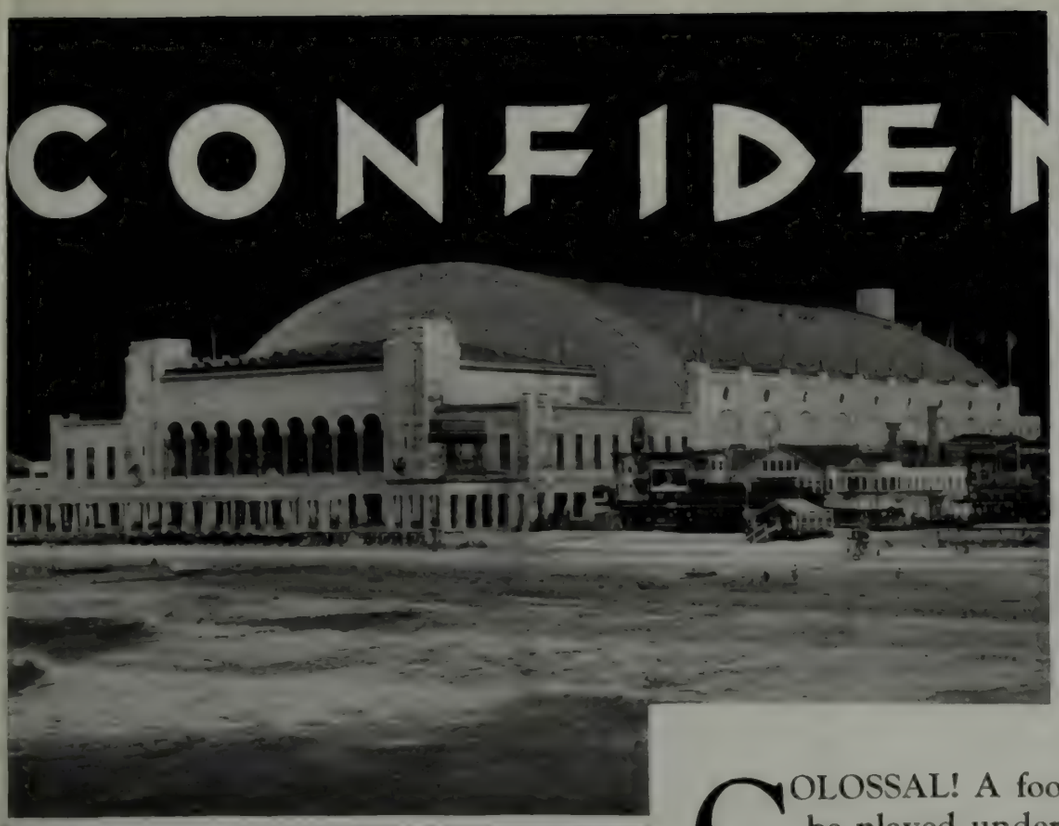
On the main floor, pictured at the right, walls are finished to simulate rough-cut limestone. On the ceiling are Woodkast beams with antique plaster between.

JACOBSON & CO.

239-41 East 44th Street

New York

CONFIDENCE



CONVENTION HALL
Atlantic City, N. J.

Architects:
Cook & Blount

Engineers:
Lockwood, Greene & Co., Inc.

Plumbing Contractor:
W. G. Cornell

COLOSSAL! A football game to be played under its roof with nearly twenty thousand spectators—such is the immensity of the new Atlantic City Convention Hall. Its size alone suggests a life limited only by the durability of the basic structure. Here, indeed, is a test for the piping. Will it outlast the building?

This challenge of time has been taken up confidently by Bridgeport "Plumrite" Brass Pipe. CONFIDENCE in this Bridgeport product has been cumulative, increasing, broadening during nearly half a century of service records. What more can be asked of any pipe than consistently trouble-free service? What else could earn for Bridgeport "Plumrite" this CONFIDENCE?

All "Bridgeport" Pipe

Is "Plumrite"

To identify mixtures, to protect you, the trademark appears every 9 inches on Bridgeport "Plumrite" Pipe.



The standard brass pipe for the average installation, for both hot and cold water lines. The mixture is Muntz metal, 60% copper and 40% zinc.



Bridgeport "Plumrite" 67% contains 67% copper and 33% zinc. In general use Bridgeport "Plumrite" Standard offers corrosion-resisting qualities fully equal to those of Bridgeport "Plumrite" 67%.



This mixture of 85% copper and 15% zinc is recommended for very severe corrosive conditions.



This pipe is pure copper, showing an analysis of 99.9%. Where conditions demand a pure copper pipe, Bridgeport "Plumrite" Copper is recommended.

And Bridgeport "Plumrite" Copper Water Tube. Pure copper tubing, flexible for bending, yet hard and strong. In ⅜" to 2". Write for detailed information on this time and money saver.

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DAWSON WAREHOUSE
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GLENN ALLEN, *Architect*

HYDRATED LIME as an admixture possesses distinctive lubricating properties which greatly increase the workability of the mix, insuring quality concrete.

The addition of hydrated lime to concrete changes the harsh, short-working mix into a fatter, smoother, more workable concrete.

A small amount of hydrated lime in your concrete mix—

—Increases density and uniformity.

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—Increases mobility, lowering cost of placing.

—Assures intimate contact with the reinforcing.

—Prevents honeycombing and reduces finishing costs.

These are but a few of the many advantages *you* can secure from the use of hydrated lime in your concrete work.

The complete story of the vital part played by hydrated lime in modern construction is given in our new booklet, just off the press. It will be sent you free, upon request.

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An organization of leading lime manufacturers formed to encourage a better appreciation of the economic value of lime in all its uses.

ROOM 713 PHILLIPS BUILDING
WASHINGTON, D. C.

101-A





40,000 square feet of 9-inch *CELLized oak blocks in the North Little Rock, Arkansas, High School. Architects: Mann, Wagner & King, Little Rock, Ark.

A very material saving in finishing cost

is effected by Maple and Beech blocks, factory-sanded, and then *CELL*ized*

Where durability of the floor is the first consideration, as in schools, department stores, chain stores, high class factories, etc., pre-sanded *CELL*ized* wood blocks meet every requirement. The unit block floor needs only to be laid in plastic cement, EVERBOND, before use. The appearance is highly pleasing.

*CELL*ized* floor blocks of oak, walnut, and Philippine hardwoods, may also be obtained pre-sanded, to be used without finishing other than polishing the *CELL*ized* surface, or waxing, if desired.



*CELLized wood blocks in the Eastern Outfitting Company Store, Los Angeles, Calif. A. Godfrey Bailey, Architect.



Newcomb College, New Orleans, La. Blocks laid by *CELLized Block Flooring Company of New Orleans.

Gymnasium floor of 4,500 square feet 9-inch *CELLized oak blocks in the Father Ryan High School, Nashville, Tenn. R. J. Regan, Memphis, Architect. Laid by Nashville Floor Laying Co. Also an attractive floor when the room is used as an auditorium.



Condensed Specification
FLOORING—Shall be..... *CELL*ized*..... Blocks, laid according to *CELL*ized* specifications over..... subfloor, by a Licensed Floor Contractor. Delivery of the *CELL*ized* Oak Flooring Inc. 5 year guarantee by the contractor will be required upon completion of the job.

LICENSED *CELLized Oak Flooring INC. FLOORING CONTRACTOR

*CELLized Wood Floor Blocks are guaranteed. Laid only by Licensed Flooring Contractors.

The unit block is rapidly laid and the floor is inexpensive in both original and upkeep costs

Laid directly over concrete in EVERBOND, *a plastic cement, providing a sound-deadening, resilient base.*

Sold through lumber dealers everywhere; manufactured by

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MEMPHIS — TENNESSEE

CARVED FIGURES AND PANEL FROM REREDOS

PARK CONGREGATIONAL CHURCH

GRAND RAPIDS, MICHIGAN

Cram & Ferguson, Architects, Boston, Massachusetts

The figure of Christ is the center figure in the Reredos. The Angels appear on the columns to the right and left of the Chancel and supporting the organ chambers.

A typical example of wood carving excellence from the American Seating Company workrooms.

A. I. A. File showing Interiors of the nation's most outstanding houses of worship and interesting designs in wood mailed to architects on request.







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Makers of Fine Seating for Churches, Schools and Theatres

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Given the right basic material, simple unwavering honesty in manufacture is the only sure means of producing a high quality product. Nothing can equal modern manufacturing methods, conscientiously and consistently applied. It is by these means that Banner converts famous Ohio dolomite into a high quality Finishing Lime. The approval of architects, contractors, plasterers and dealers demonstrates the practical wisdom of this policy.

NATIONAL MORTAR & SUPPLY CO., PITTSBURGH
CHARTER MEMBER FINISHING LIME ASSOCIATION OF OHIO



Banner Lime
FAMOUS OHIO FINISH

"A Charity Ball will be held here tomorrow night—and then the basketball tournament."



Municipal Auditorium-Gymnasium, Ft. Atkinson, Wis.
Law, Law & Potter, Architects



Any degree of resiliency can be secured by laying BLOXONEND over floor strips spaced to suit

THIS Municipal Building is primarily a community gymnasium. When not so used, it accommodates important functions of a civic nature including auto shows, charity balls and lectures.

The Floor of BLOXONEND adds dignity and charm to the room and provides a surface that is admirably suited to each of these activities. BLOXONEND lasts a lifetime and stays smooth. It is quiet, safe, sliver and splinter proof, comfortable, resilient and fast, and is susceptible to any desired finish.

Nearly all prominent school architects specify BLOXONEND for gymnasiums and school shops. Write for sample and literature.

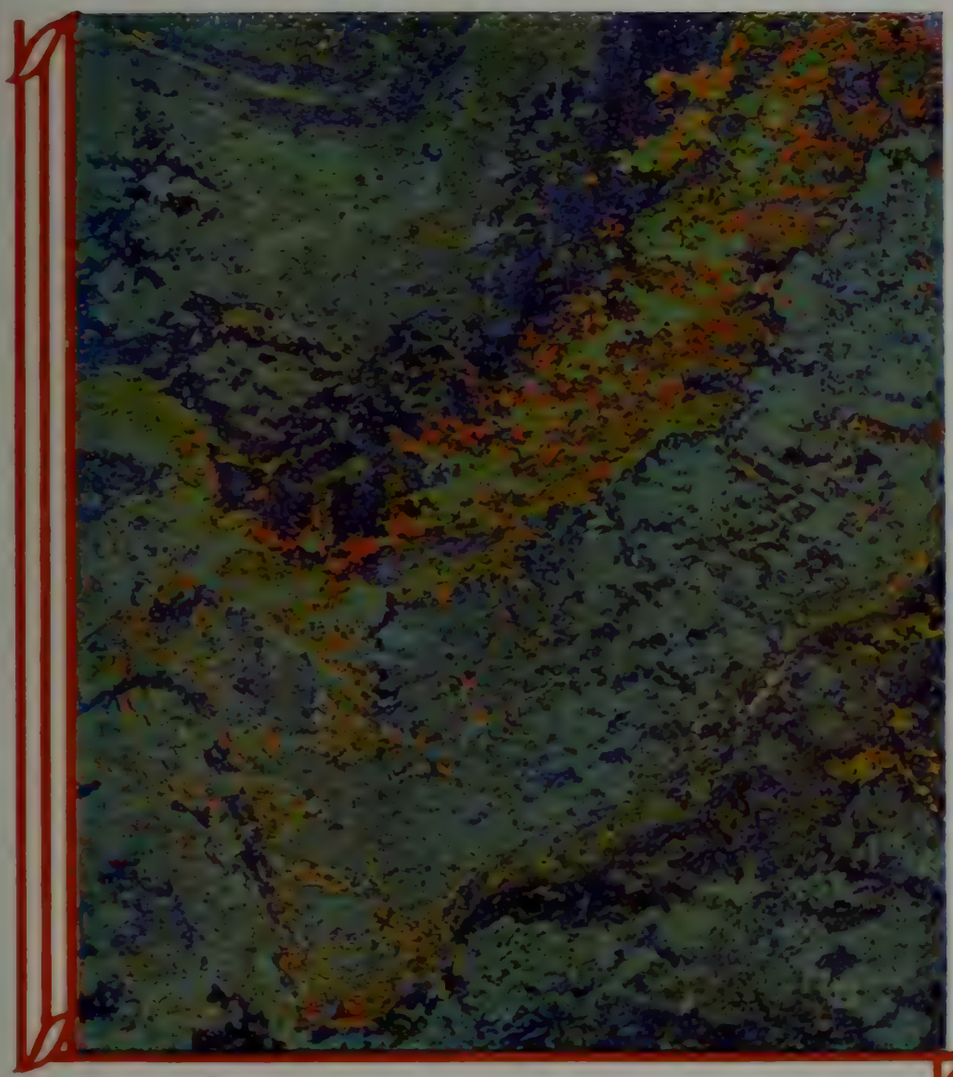
CARTER BLOXONEND FLOORING COMPANY
Kansas City, Missouri
Offices in Leading Cities—See Sweet's

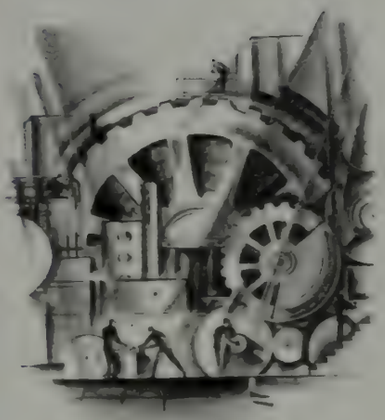
BLOX-ON-END FLOORING



Bloxonend is made of Southern Pine with the tough end grain up. It comes in 8 ft. lengths with the blocks dovetailed endwise onto baseboards

Lays Smooth
Stays Smooth





What!

—beauty from a machine?

ON every hand, sorrowful philosophers are shaking their fingers—or fists—at the Machine. "This evil monster is turning us into a nation of Robots," they sob. "It is killing Beauty."

We wish these tearful gentlemen could see the new Karnean Marbled patterns in *Sealex* Inlaid Linoleum.

In these strangely beautiful designs, the machine has finally overcome its worst fault—*monotonous repetition*. Each marbled tile has spontaneity—individuality—delightful little details in coloring and marking that will not be duplicated no matter how long the machine runs.

In one tile, one subordinate color appears only in brief glimpses; in another, it strikes out as boldly as a jagged streak of lightning.

Please do not expect to find this "unpremeditated beauty" —this wonderful marble realism—in any other type of linoleum. Karnean Marbled effects are obtainable only in *Sealex* Linoleum, manufactured by Congoleum-Nairn Inc.



THIS is the *"Barcelona"* pattern (No. 3213) in *Sealex* Inlaid Linoleum. Tiles extraordinarily rich in color and unusual in shape give a very modern look to this distinctive design.

At the top of the page is reproduced a section (actual size) of this design. Observe the delicacy of the marbled effects —the pleasingly irregular veining—the little touches of orange sparkling out amid the darker greens and blues.

See next page

These new Sealex floors are practical as well as handsome



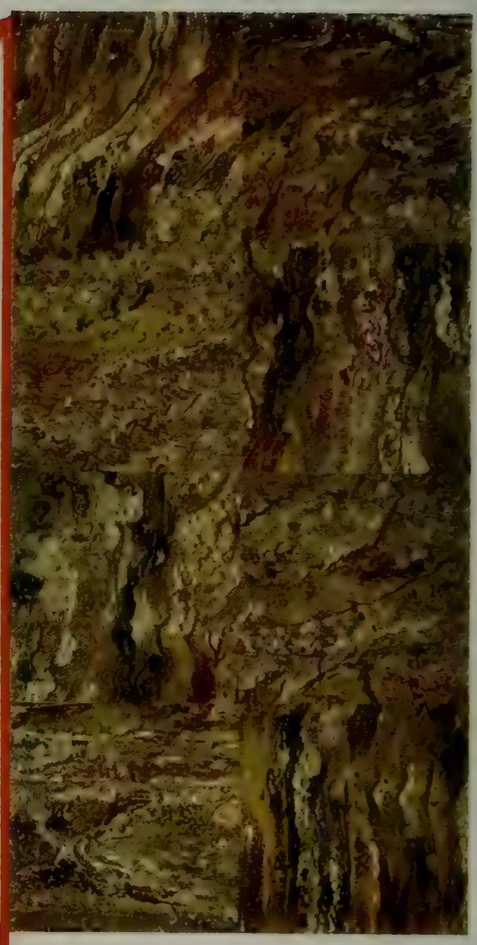
Sealex Linoleum and *Sealex* Treadlite Tile are useful wherever quietness and resilience are desirable. Their sphere ranges from the residence and smart shop to the office, hospital and school.

In pre-Sealex days, spots on linoleum floors must have been responsible for floods of bad language. When grease or ink or what-have-you fell on old-fashioned linoleum, millions of microscopic pores in the material would invite the liquid to step inside and make itself at home. This hospitality to spots and stains was the only drawback to an otherwise perfect floor.

In linoleum manufactured by Congoleum-Nairn's exclusive *Sealex Process*, every one of these invisible pores has been *sealed*. Liquids can't soak in. Dirt won't grind in. Cleaning amounts to nothing more than a light easy mopping. This ease of cleaning means *lasting* beauty, as well as economy in maintenance cost.

Sealex floors include a wide variety of patterns and types, only a few of which can be shown on this and the preceding page. May we send you our complete 1930 catalog?

CONGOLEUM-NAIRN INC., *General Office*, Kearny, N. J.
Branches in principal cities



Above is shown the "*Virginian*" (Sealex Linoleum No. 3227). Browns, golds and tans mingle delightfully in this lovely pattern, inspired by the beautiful walnut brown marble quarried in Virginia.

Each tile in this pattern is 9 by 9 inches. Obviously, this small illustration can not do full justice to the beauty of the veining and coloring.



Left: The warm red jasper colorings of "*Camelot*" (Sealex Embossed Inlaid Linoleum No. 2602) bespeak the old-fashioned hospitality and cheer.

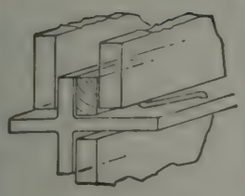


Lower left: Light gray and verde antique blend beautifully with the excellent reproductions of serpentine marble found in "*Cavalier*" (Sealex Linoleum No. 3093).

WHEN *Sealex* floor materials are installed by an Authorized Contractor for Bonded Floors and according to Bonded Floors specifications, the completed floor carries a Guaranty Bond issued by U. S. Fidelity and Guaranty Co. Write for complete information about this expert installation service.

SEALEX LINOLEUM

— *See preceding page*



The remarkable cruciform bar permits inside, outside or double glazing

Now and for the first time you can order window sash as enduring as your buildings † Fumes, smoke, soot, steam or salt air cannot harm it † Known and specified by architects and builders everywhere as "Wrought Iron Sash—MESKER" † Fabricated with amazing strength and rigidity from the exclusive MESKER cruciform type bar † Learn more about it † Request Folder AR †

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Seven Important Canadian Bryant Installations

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Architects, Watt & Blackwell, London
Electrical Contractors, A. N. Knowles, London

2 *Canada Permanent Mortgage Building, Toronto*
Architect, S. Hilton Wilkes, Toronto
Assoc. Architects, Sproat & Rolph, Toronto
Elec. Contractors, Canadian Comstock Co., Toronto

3 *Dominion Square Building, Montreal*
Architects, Ross & McDonald, Montreal
Electrical Contractors, Can. Comstock Co., Montreal

4 *Chateau Frontenac, Quebec*
Architect, W. S. Maxwell, Montreal
Electrical Contractors, Canadian Comstock Co., Montreal

5 *Royal York Hotel, Toronto*
Architects, Ross & McDonald, Montreal
Electrical Contractors, Can. Comstock Co., Toronto

6 *Bell Telephone Building, Montreal*
Architects, Barott & Blackader, Montreal
Cons. Engs., McDougall & Friedman, Montreal
Electrical Contractors, Canadian Taverner Company

7 *Sun Life Assurance Building, Montreal*
Architects, Darling & Pearson, Toronto
Assoc. Architect, A. J. C. Paine, Montreal
Cons. Eng., E. A. Ryan, Montreal
Electrical Engineer, John A. Mencke, New York
Electrical Contractors, Canadian Comstock Company, Montreal

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across the Border

AS in the States, many of the most important buildings in Canada are "Bryant Equipped." Seven of these are shown above—the famous Chateau Frontenac; The Royal York, the largest hotel in the British Empire; and so on. Bryant "Superior Wiring Devices" are favorably known the world over and invariably meet with enthusiastic acceptance by leading Architects, Engineers and Contractors . . . and, what is more important, give lasting and satisfying service to owners . . . those who pay the bills.

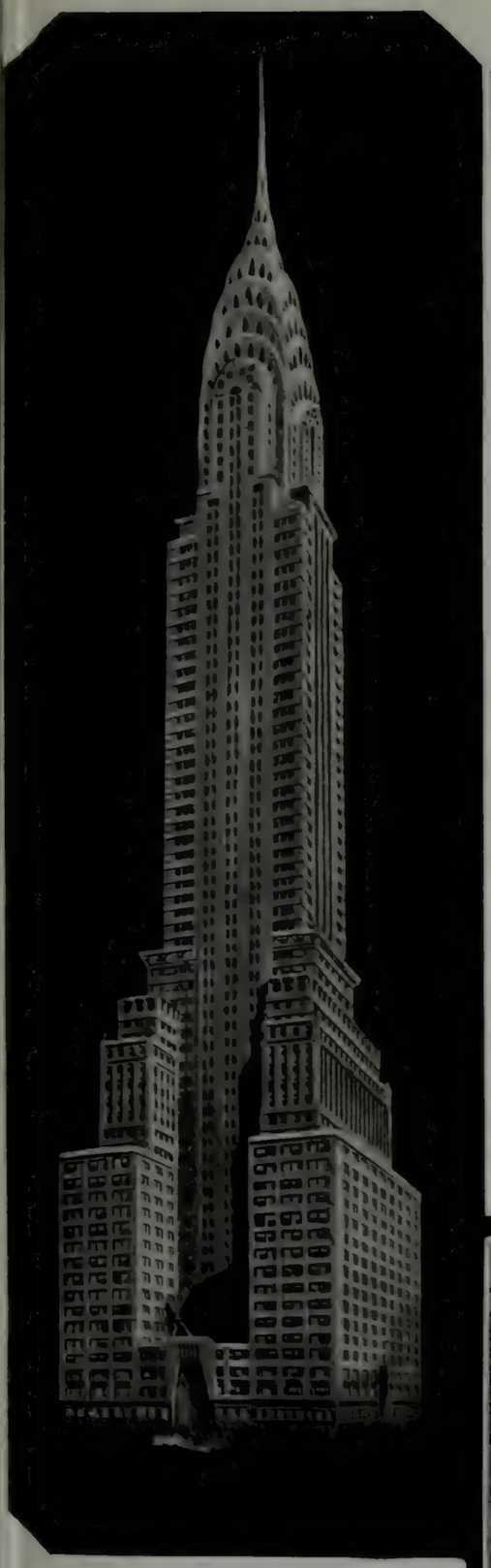
See our Catalogue in the new 4-volume Sweet's for 1930, Vol. D, pages 5188 to 5192

THE BRYANT ELECTRIC COMPANY

342 Madison Ave., New York, N. Y. | Widener Bldg., Philadelphia, Pa. | BRIDGEPORT CONNECTICUT | 844 West Adams Street, Chicago, Ill. | 149 New Montgomery St. San Francisco, Calif.

MANUFACTURERS OF SUPERIOR WIRING DEVICES SINCE 1888

A-2



WILLIAM VAN ALEN, Architect
FRED T. LEY & CO., Inc., Contractors
KNICKERBOCKER FIREPROOFING CO.
Fireproofers

ACHIEVEMENT

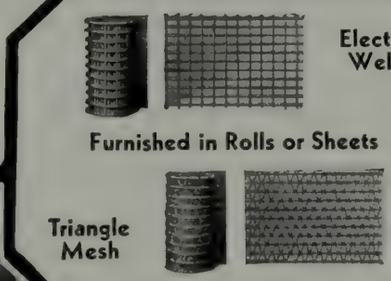
TYPIFYING the spirit of achievement in modern architecture, the new Chrysler Building also exemplifies the important part being played by wire fabric in every type of structural development.

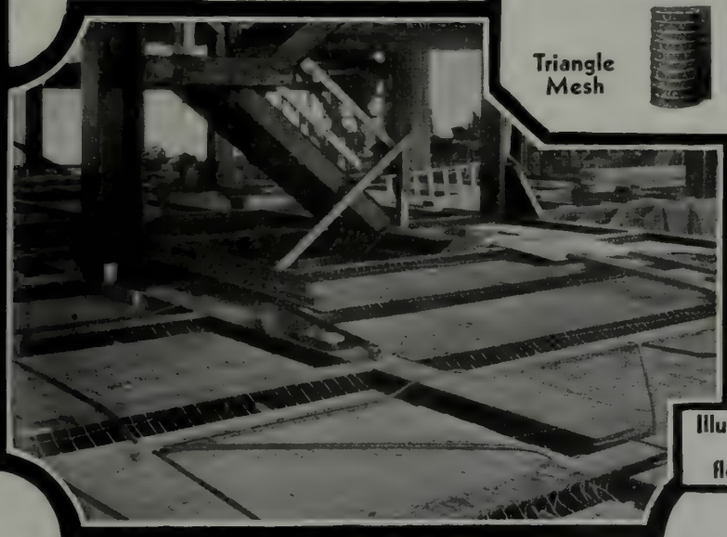
Here — where cinder concrete floor arch reinforcement is called for, American Steel & Wire Company Wire Fabric is recognized as standard. Its definite factors of safety, its great strength and permanency, win for it the enthusiastic approval of architects and contractors.

Information, including engineering data on Wire Fabric for concrete reinforcement, will be furnished on request.

Wire Fabric

The Steel Backbone of Concrete





Illustrating Wire Fabric used as floor reinforcement.

AMERICAN STEEL & WIRE COMPANY

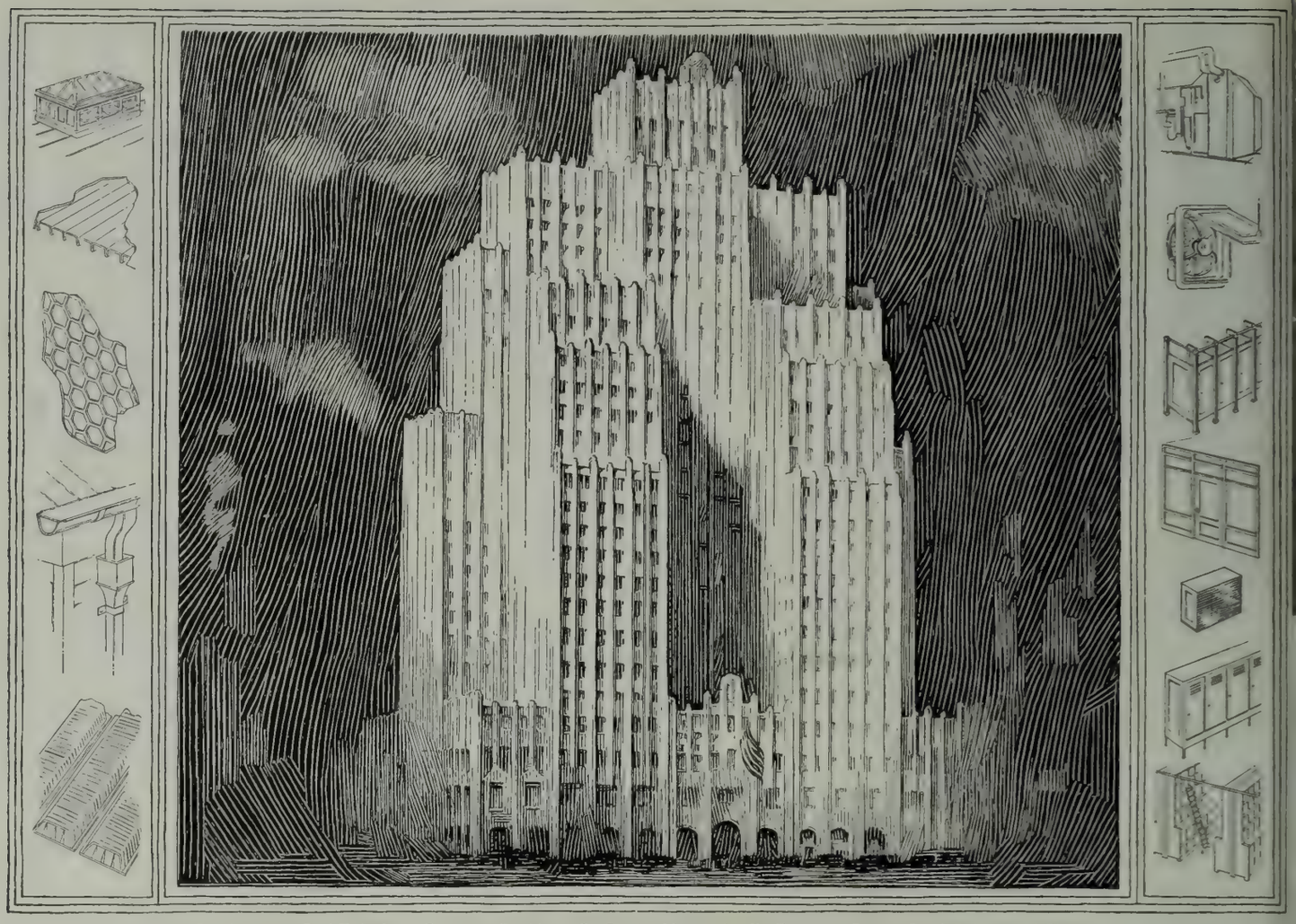
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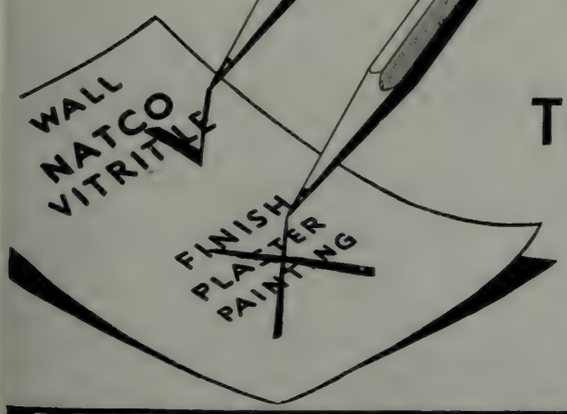
Stairway, State Armory, Latrobe, Pa. J. F. Kuntz, Architect

CHOOSE THIS — AND BAN THIS

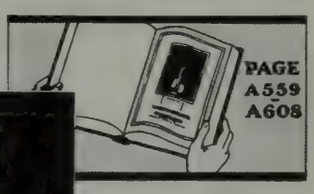
Tile-setter—plasterer—painter—are all united in one, when Natco Vitritile walls are laid. For each unit forms a section of a load-bearing wall, with the finish in place; finish that will last as long as the building, that never cracks, crazes, or discolors, that never needs painting, varnishing, or other maintenance.

Natco Vitritile is furnished in a range of beautiful shade-blends, that gives the architect plenty of latitude in color design. A comprehensive line of shapes and sizes give plenty of latitude in structural design. The size of the units speeds erection, promotes economies; the permanent glaze makes the wall easy to clean and keep clean, always sanitary, always attractive.

Write Natco Vitritile into the specifications—and you write off all worries about plastering, painting, finish;—and write off a load of maintenance from the owner's shoulders. Widely used—its excellent qualities demonstrated by repeated reorders from users—Natco Vitritile is a good thing to know about, a fine thing to use.



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THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

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THE LARGEST CONCERN IN THE WORLD MAKING A COMPLETE LINE OF STRUCTURAL CLAY PRODUCTS

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THIS IS BALANCED LIGHTING *THIS ISN'T*



. . . which child has the better chance?

FOR BALANCED LIGHTING, WEIGH:	
Horizontal Light vs.	Reflected Glare
Vertical Light vs.	Direct Glare
Shadow Depths vs.	Flat Shadows
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Showing how various factors balance, for best results

Look at the "picture" of the light falling on these two children . . . Light can play strange pranks. Glare . . . shadow . . . dangerous eyestrain may be caused by otherwise excellent lighting units, if improperly placed. Engineers have found the most efficient school lighting to be a balance of many variable factors, such as intensity of illumination . . . type of fixture . . . location . . . costs . . . Hence *Balanced Lighting*, the scientific "yardstick" of the Graybar lighting line. Let Graybar's lighting specialists show you how to apply this "yardstick" to *your* problems.

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OFFICES IN 76 PRINCIPAL CITIES. EXECUTIVE OFFICES: GRAYBAR BLDG., NEW YORK, N. Y.

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IN SUMMER COOL FRESH AIR . . FANNED INTO EVERY HOT SPOT

Automatic Oil-burning forced air furnace—ALL for the price of a good oil-burner

Here is the real sensation for which the heating world has long been waiting—a warm air furnace with an automatic oil-burner with force feed circulation that sends a stream of warm, healthful, humidified air through the house in winter, and stirs up the air circulation through the house in the summer.

And here is the best part of all. Everyone of these features is combined in a single unit not applied to another heating plant, but all calculated with perfect precision—ALL of these features can be had for the price of a good oil-burner alone.

To architects, to builders, to buyers of homes, the Piatt oil-burning furnace comes as a sensational development. Basement space is saved because the pipes can be made smaller and the furnace placed in any convenient location without affecting the circulation.

The heat is provided by the famous Piatt principle of oil combustion with no weights or springs or complications—safe, automatic, proved on battleships. Send for complete technical data.

MOTOR WHEEL CORPORATION
Heater Division LANSING, MICHIGAN

BURN OIL **PIATT** OIL-BURNING APPLIANCES SAVE TOIL



TRADE **YALE** MARK

MONO-LOCK SET

—a complete metallic unit, including the lock and trim . . .

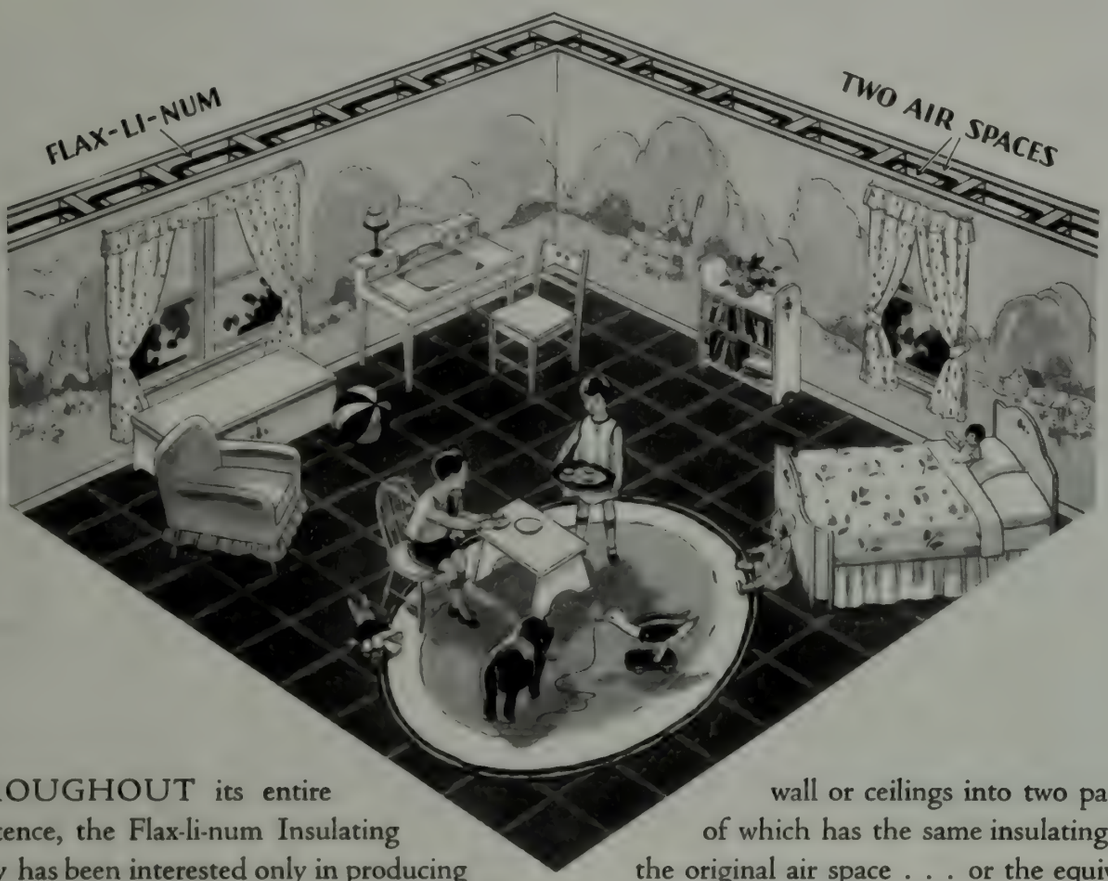
The lock and trim, exactly as assembled at the Yale Factory, go on the door in the identical condition in which they leave the factory. ■ Yale Mono-Lock Sets are made with that same fidelity and precision which characterize the manufacture of Yale Bank Locks ■ Accurate fit is definite and certain. Duplicate parts can be furnished years afterward with an assured fit. Yale Mono-Locks can be furnished with a cylinder which may be changed without removing the lock from the door. ■ Yale Mono-Lock Sets can be mastered-keyed. Any desired combination of master and change keys may be obtained. ■ The simple and substantial mechanism is contained within a closed case of cast metal—fully protected against dirt and disturbance in use. Case is attached to bronze front integral with outside escutcheon plate. ■ The spring plunger is automatically pushed in when the door is closed, and in this position causes the bolt to be deadlocked so that it cannot be retracted by end pressure. In this way, by means of a single, heavy bolt, the convenience of a latch bolt and the safety of a dead bolt are obtained without enlarging the lock. ■ For simplicity of installation, beauty, security and permanence install YALE MONO-LOCK SETS. ■ They can be furnished in standard designs, or designed especially to accord with the architectural motif of the structure.

THE YALE & TOWNE MFG. CO., STAMFORD, CONN., U. S. A.

Canadian Branch at St. Catharines, Ontario

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FLAX-LI-NUM is 50% more effective
because of its "two-air-space" method of application!



THROUGHOUT its entire existence, the Flax-li-num Insulating Company has been interested only in producing an insulating material which, when applied according to specifications, will yield the maximum protection from cold or heat . . . and afford greater fuel economy.

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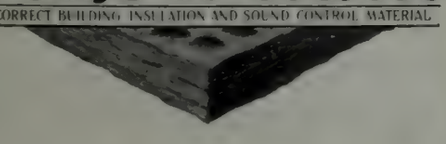
This is pure, single purpose insulating . . . rewarded by greater insulating value. FLAX-LI-NUM is made in ½ inch and full one inch thicknesses. It is quickly and easily installed. It slips between the studs and is permanently held in place with small binding strips . . . Both the application and the material are highly developed.

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•Modern Buildings everywhere are being equipped with **FANTOM RADIATORS**

● Recessed beneath the window, with its flat surface flush with the wall, the new American Fantom Radiator becomes an integral part of the architectural scheme. It possesses all the advantages of the ideal radiator... It is unobtrusive and out-of-the-way. From its surface radiates pure, stimulating, radiant heat, like that from the sun, while through the grille work at the top flows genial warmth to every corner of the room. It matches anything from a drape to a divan.

● The Fantom has won preference by leading architects, and is installed in many of the foremost of modern buildings throughout the country.



New York Central Building

● In New York, for example, the Lincoln Building, the New York Central Building, the Lefcourt National Building, the Chanin Building, the Savoy Plaza Hotel, the Squibb Building, the Bank of Manhattan Building and many other thoroughly modern buildings have been equipped with these radiators.

● The Fantom Radiator saves space, conserves health, and identifies the building in which it is installed as being equipped with the best that can be made today.

AMERICAN RADIATOR COMPANY

40 WEST 40TH STREET, NEW YORK CITY

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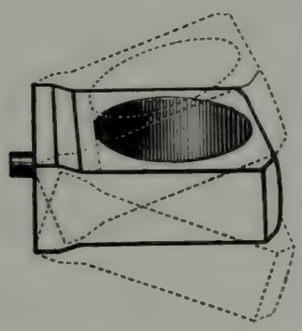
with a burglar-proof jimmy-proof BOLT—

plus

a self-adjusting strike *that defies door shrinkage, warp and sag*



This new NORWALK *lock embodies, by special arrangement, the patented jimmy-proof features of the famous SEGALOCKS*



At last . . . a NORWALK lock masterpiece that burglar-proofs as well as ornaments the door it equips. A turn of the key makes it a quick, easy operating latch . . . another turn, an impenetrable, jimmy-proof lock. Ingenious and patented construction features make it the most outstanding advance in lock craftsmanship today. Despite the fact that the door may shrink, sag or warp . . . the vertical cross-bolt *always* locks through the self-adjusting strike. Door and casing are inseparably joined . . . the door becomes part of the wall. The advantages of this new type of NORWALK lock are obvious. Architects and builders, interested in this remarkable lock, are invited to write for further information.

NORWALK LOCK CO., 12 Warren St., New York

NORWALK
HARDWARE OF QUALITY SINCE 1856
LOCKS
AND BUILDER'S HARDWARE



THE
NEW YORKER
HOTEL

Architects: Sugarman & Berger, New York. General Contractor: Mack Kanner, New York. Plaster Contractor: Davis Brown, Inc., New York. Hawk Spread White Finish supplied by Murtha & Schmohl, New York

Comfortable, Noiseproof Rooms *for* Guests

WHEN Architects Sugarman & Berger approved a plaster finish for the New Yorker, Hawk Spread Ohio White Finish was accepted because of its freedom from pits and pops, its ability to receive and preserve modern decorative treatment, and its resistance to sound transmission and reverberation.

Hotel guests prefer quiet rooms made more comfortable and pleasing by the use of Hawk Spread Ohio White Finishing Lime Plaster which is particularly adapted for hard white, textured and base coat plastering.

See Page B-1981
SWEETS

OHIO HYDRATE & SUPPLY CO.
WOODVILLE • OHIO
Charter Member of the Finishing Lime Association of Ohio

for BETTER PLASTER Specify OHIO WHITE FINISH

Our lime is marketed under four brand names—Ohio, Hawk Spread, Woodville, Buckeye. All are of equal quality—all are packed in Red Zig Zag Bags



To the left, an inviting corner in the smoking room of Arizona-Biltmore Hotel, Phoenix, Arizona. Below, the unique exterior. Built of reinforced concrete, faced with cast stone blocks. Interior walls also of cast stone, in plain and conventional designs. Albert Chase McArthur, Phoenix, Architect; Frank Lloyd Wright, Associate; S. M. Benet & Co., Beverly Hills, California, Contractors.



A most interesting era in ARCHITECTURE *is at hand*

Eight miles out of Phoenix is the Arizona-Biltmore Hotel—forerunner of an advanced stage in modern architecture and construction.

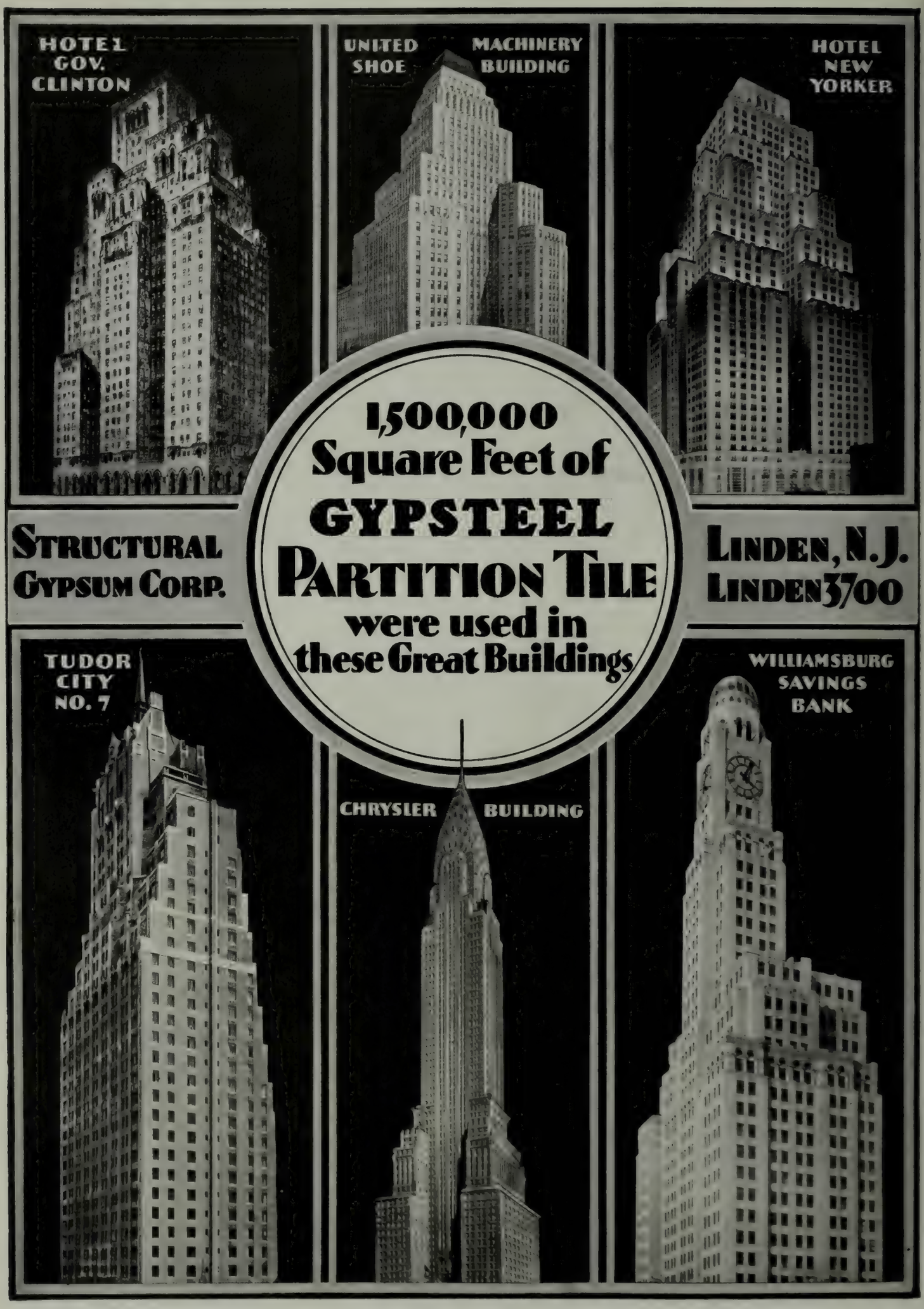
The hotel, and 16 cottages adjoining, are all of reinforced concrete framework. Floors, stairways, and roofs are of concrete. Exterior walls are of cast stone blocks. All four edges of blocks are grooved to accommodate steel reinforcing rods—running vertically and horizontally—embedded in the mortar with which blocks are laid up.

Interior walls, columns, and exposed beams, in the public rooms, are faced with the same cast stone used on the exterior. Most of the materials used in construction were obtained locally. Further information is available, if desired

PORTLAND CEMENT *Association*

Concrete for Permanence and Firesafety

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HOTEL GOV. CLINTON
UNITED SHOE MACHINERY BUILDING
HOTEL NEW YORKER
1,500,000 Square Feet of GYPSTEEL PARTITION TILE were used in these Great Buildings
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TUDOR CITY NO. 7
CHRYSLER BUILDING
WILLIAMSBURG SAVINGS BANK



HOTEL BROWNSOM, MAPLEWOOD, MO.
W. Mills, Architect
St. Louis, Mo.

FOR the convenience of all architects Wright Rubber Tile is illustrated in thirty colors, with complete data, in Sweet's Architectural Catalog. This same information in file size pamphlet form is available to contractors and will be mailed without cost or obligation.

Wright Rubber Products Co.
Racine, Wisconsin

WRIGHT RUBBER TILE
Rubber Only Material That Withstands Tire Road Wear



Original Design by Nicholas B. Vassilieve

WASH ROOMS *in the Modern Manner*

Walls and partitions of gleaming white Frostex, with its slightly rippled surface, are accented by the use of polished black Carrara in this modern toilet room.

The restrained elegance, the sharp contrasts of white with black, the brilliant high lights and softened shadows—these expressions of modernism demand just such a medium as Carrara . . . This structural glass brings also another very great advantage—it cannot absorb moisture or odors. Our Architectural Representative will gladly bring you full information.

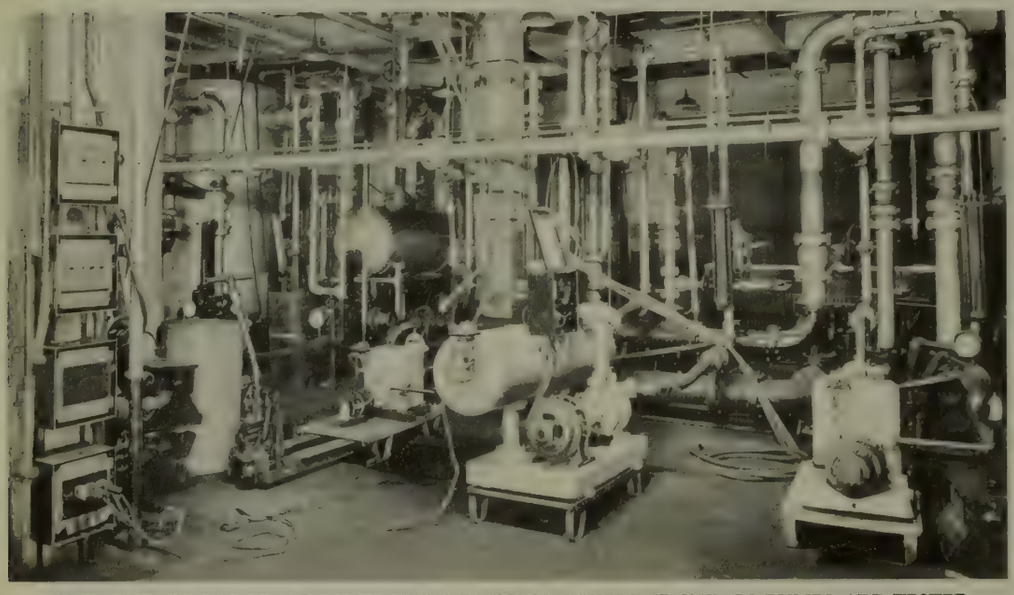
PITTSBURGH PLATE GLASS COMPANY, PITTSBURGH, PA.
Conveniently Located Warehouses in All Leading Cities

CARRARA
Modern Structural Glass



Square foot pump ratings *often are* "more bark than bite"

Catalog Ratings Should Be Confirmed *by tested air and water capacity*



ONE END OF LABORATORY IN NASH FACTORY WHERE JENNINGS PUMPS ARE TESTED



In serving a heating system, a pump handles either air alone, water alone, or both air and water together. The quantities it is called upon to remove do not depend exclusively on the amount of radiation in the system. They are influenced by many varying conditions. The degree of tightness of joints and fittings, the age of the system, the temperature of the condensate, the length of runs to radiators are but a few such determining factors.

If they are to apply to every type of system, heating pump ratings in square feet of radiation should make allowances for these variable factors. Therefore, in order to live up to the promises implied in its catalog ratings, a pump should have ample combined air and water capacity. For, it must assure complete removal of returns from the radiation in actual practice.

In every instance, square foot ratings should be confirmed by *tested* air and water capacity.

Jennings Ratings Based on Tested Capacities

A Jennings Vacuum Heating Pump will operate satisfactorily on any reasonably well installed system of the size for which it is rated. It will serve for the life of the building.

The combined air and water capacity of every Jennings Pump is determined by actual test before it leaves the factory. The volume of water in gallons per min. that the pump removes from the receiving tank is carefully measured. At the same time the number of cu. ft. per min. of air that the pump withdraws from the receiving tank is determined by means of a calibrated orifice. These tests are made while the pump is working under a prescribed vacuum, delivering water against a specified head, and discharging air to the atmosphere. A certified report of the results is furnished to the purchaser on request.

Jennings Design Assures Dependable Economical Operation

Air and water are handled separately by the Jennings Vacuum Heating Pump. Air capacity is not affected by the volume of water being pumped. Water capacity remains constant when air is being handled. Combined air and water capacity is, therefore, maximum air capacity plus maximum water capacity.

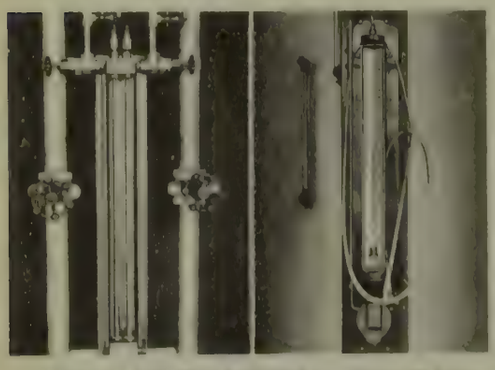
Since the condensate is handled only once by a Jennings, less horsepower is required. Economical operation is assured.

These features are found only in the Jennings pump.

Certified test reports, guaranteeing Jennings capacities, and verifying square foot ratings, afford the only reliable basis upon which to compare vacuum heating pumps.



CERTIFIED REPORT OF TEST



TYPES OF VENTURI METER AND VACUUM MANOMETER USED IN TESTING JENNING PUMPS

CAPACITIES OF JENNINGS VACUUM HEATING PUMPS

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T	2,500	4	3	1/64	1/4	1/2	1	1 1/2
U	5,000	9	3	1/64	1/4	1/2	1	1 1/2
V	10,000	14	6	3/32	1	1	1 1/2	2
B	16,000	22	9	3/16	1 1/2	2	3	5
C	26,000	35	15	1/4	2	3	5	5
D	40,000	60	19	7/32	3	5	5	7 1/2
E	65,000	90	34	5/16	5	5	7 1/2	10
F	100,000	140	50	3/8	7 1/2	10	15	15
*G	150,000	200	102	5/16 & 3/16	10	15	UPON REQUEST	
*H	300,000	400	171	2 - 3/8 & 1 - 5/16	UPON REQUEST			

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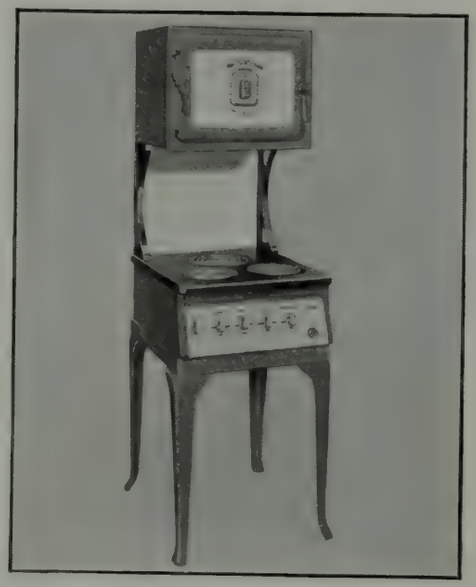
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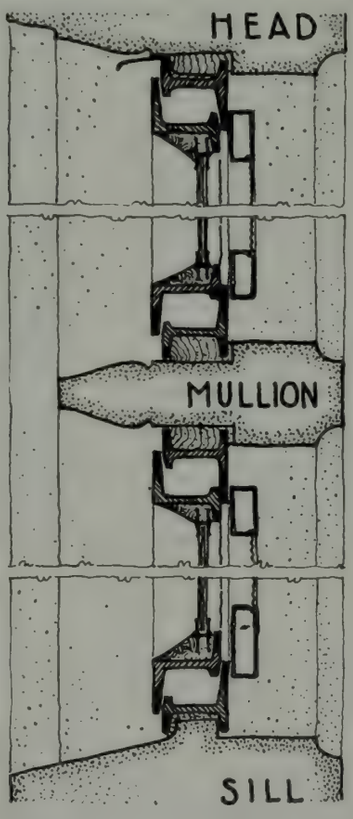
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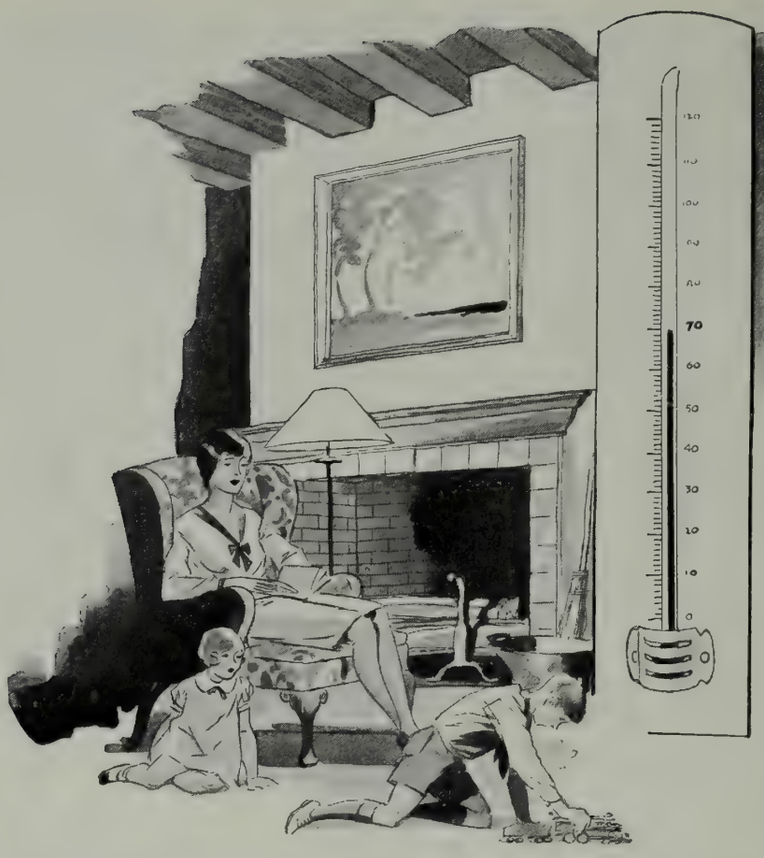
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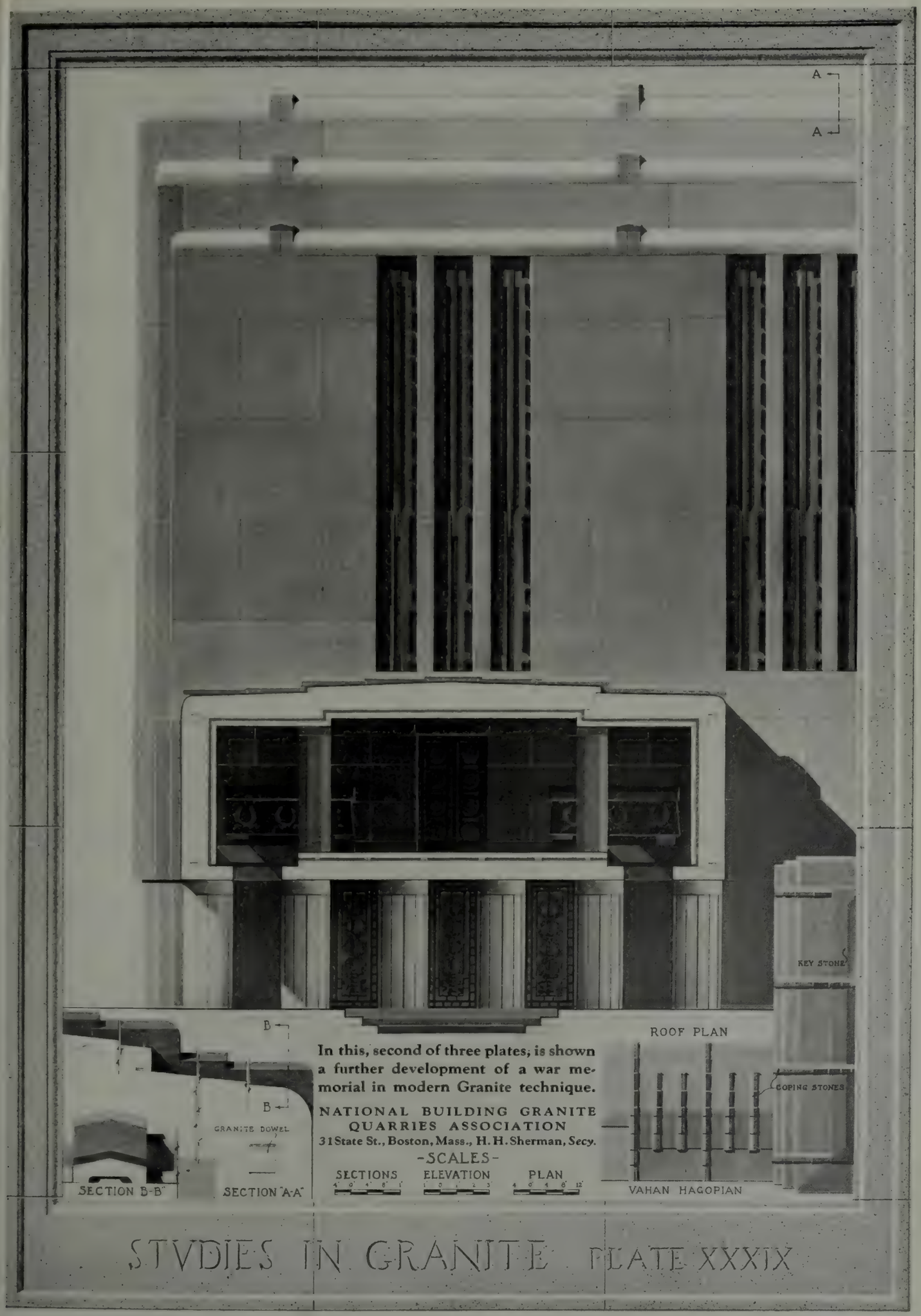
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The Insulating Plaster Base

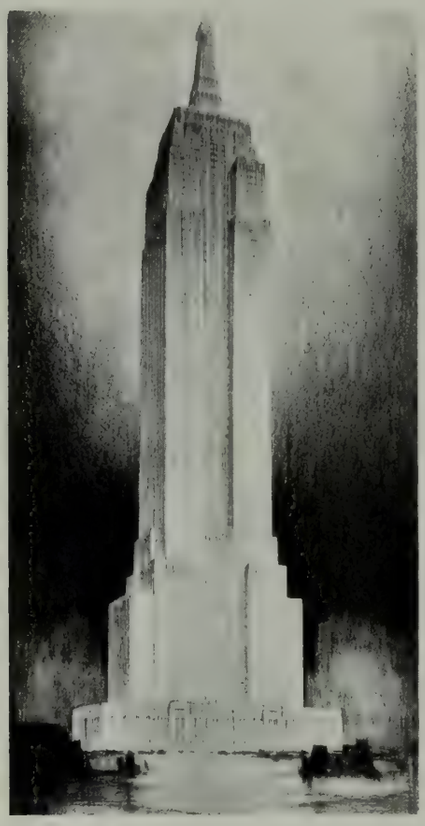
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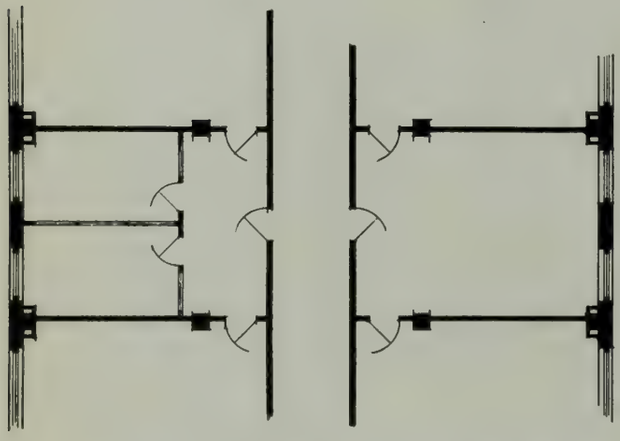
Write for sample and make your own tests.


A
A
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B
B
GRANITE DOWEL
SECTION B-B"
SECTION A-A"
In this, second of three plates, is shown a further development of a war memorial in modern Granite technique.
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-SCALES-
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ROOF PLAN
COPING STONES
VAHAN HAGOPIAN
STVDIES IN GRANITE PLATE XXXIX

THE ECONOMIC *DESIGN* OF THE OFFICE BUILDING



The Empire State Building, New York City, Shreve, Lamb and Harmon, Architects. The first plans of this building to be published will be found in this issue



An Office and Corridor Unit, the proper multiplication of which, according to Mr. Shreve's demonstration, will result in a good plan for almost any office building

No subject is more timely than the economic set-up of the office building. But not all the facts that have been gathered, in the many recent publications on the topic, are of actual use to the architect.

The architect's approach is surely from the standpoint of *design*. The problem of economic design embraces all the contributory problems of the proper height, life, efficiency, and attractiveness.

In Mr. R. H. Shreve, of the firm of Shreve, Lamb and Harmon, was found an architect ready and willing to talk to just this point. No choice could have been more welcome to the editors. Speaking as an architect, Mr. Shreve—better than any representative of financial, real estate, or manufacturing interests, however able—could merit the architect's confidence. Moreover his own firm has an unexcelled reputation for the combination of skill, economic aptitude, and attractiveness in its work, so that it has been entrusted with the fortunes of the tallest building in the world, the Empire State Building, now in process of construction in New York City.

Mr. Shreve's treatment is lucid and expert. Especial attention may be called to his discussion of the *office unit*. Just as mathematics made an enormous step with the discovery of the number *one*, so city architecture can make great progress with the discovery of the *unit cells* upon which it is built. The two pages on which Mr. Shreve shows this unit, together with examples of its multiplication in several good office-building plans, is, we believe, one of the short classics of the architectural art.

THE ARCHITECTURAL RECORD is pleased to announce further that the firm has consented to the use with this article of some of the plans of the 85-story Empire State Building.

In the *Technical News and Research* section the economic study is carried on, into the question of proper relationships between building and land. A method of approach is outlined which may be of great service to the architect who wishes to be in a position to give full professional counsel.

SOME OTHER ARTICLES IN THE APRIL ISSUE

Three schools are published in this issue, each with a different problem and different treatment: one is a nursery school, by Howe and Lescaze; one a primary and intermediate school, by Clarence S. Stein and Robert D. Kohn, and the third is for adult education, by Joseph D. Urban. On the subject of public buildings, there is the story, by Mr. Arthur T. North, of a unique study made for the City Hall at Camden, N. J., with the inauguration of the commission plan of government.

Coming in May

TECHNICAL NEWS AND RESEARCH: *THE THEATRE*

The technical resources of the theatre are developing with extraordinary rapidity. Theatres are now planned to include within their scope the "legitimate" stage, the moving picture, and last of all, the talking film.

At the same time there is a great spread of the community theatre movement, into every city, town, and hamlet. There may soon be scarcely a high school auditorium without its stage.

Under the circumstances there is need for exact knowledge of stage requirements. Even the theatre department of a large university, according to a reliable report, recently came close to building its own experimental stage with insufficient clearance for the stage mechanism.

In making its study of the theatre, therefore, THE ARCHITECTURAL RECORD has consulted every possible authority. Mr. Lee Simonson, perhaps the leading stage designer in the United States, with a thoroughgoing experience in the theatre arising partly from his activity as a director of the famous Theatre Guild, has written the leading article.

•

Others, consulted in the preparation of the *Technical News and Research* article, written by Mr. Robert L. Davison of THE ARCHITECTURAL RECORD staff, include:

Kenneth Macgowan, of the Provincetown Theatre, author of *Footlights Across America*, widely acquainted with the community theatre movement;

Norman Bel Geddes, designer, known for his work with the Max Reinhardt Theatre and his study of theatre trends into the future;

Munroe R. Pevear, Architect, thoroughly acquainted with the special problems of stage lighting in its latest developments;

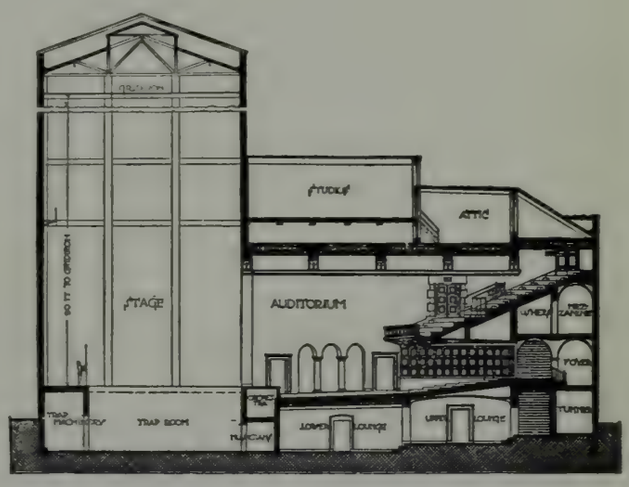
G. T. Stanton, of the Electrical Research Products Inc., for acoustics in connection with talking films; and a host of other specialists.

•

The treatment of the Theatre in the *Technical News and Research* section follows the method usual in these studies: the problem is carried forward, step by step, as the architect faces it; the entire study is compressed into a single article, to avoid duplication and waste; the article itself thus becomes an extended specification and checking list, with all the necessary explanation appended to every item.



Model by Norman Bel Geddes of a self-contained group of theatres proposed for the Chicago World's Fair of 1932.



Section through the playhouse of the Theatre Guild in New York City, showing space needed for the "grid." C. Howard Crane and Kenneth Franzheim, Architects.



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FRONTISPIECE

THREE COLOR-PLATES

MARBLE FLOOR IN HOSIOS LOUKAS MONASTERY, GREECE

DRAWN BY ANDRÉ LECONTE

In the Architectural Record Series of Polychrome Floors



MARBLE FLOOR IN HOSIOS LOUKAS MONASTERY. GREECE

. PLANE .

ARCHITECTURAL RECORD SERIES.
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BY HAROLD DONALDSON EBERLEIN AND ROGER WEARNE RAMSDELL

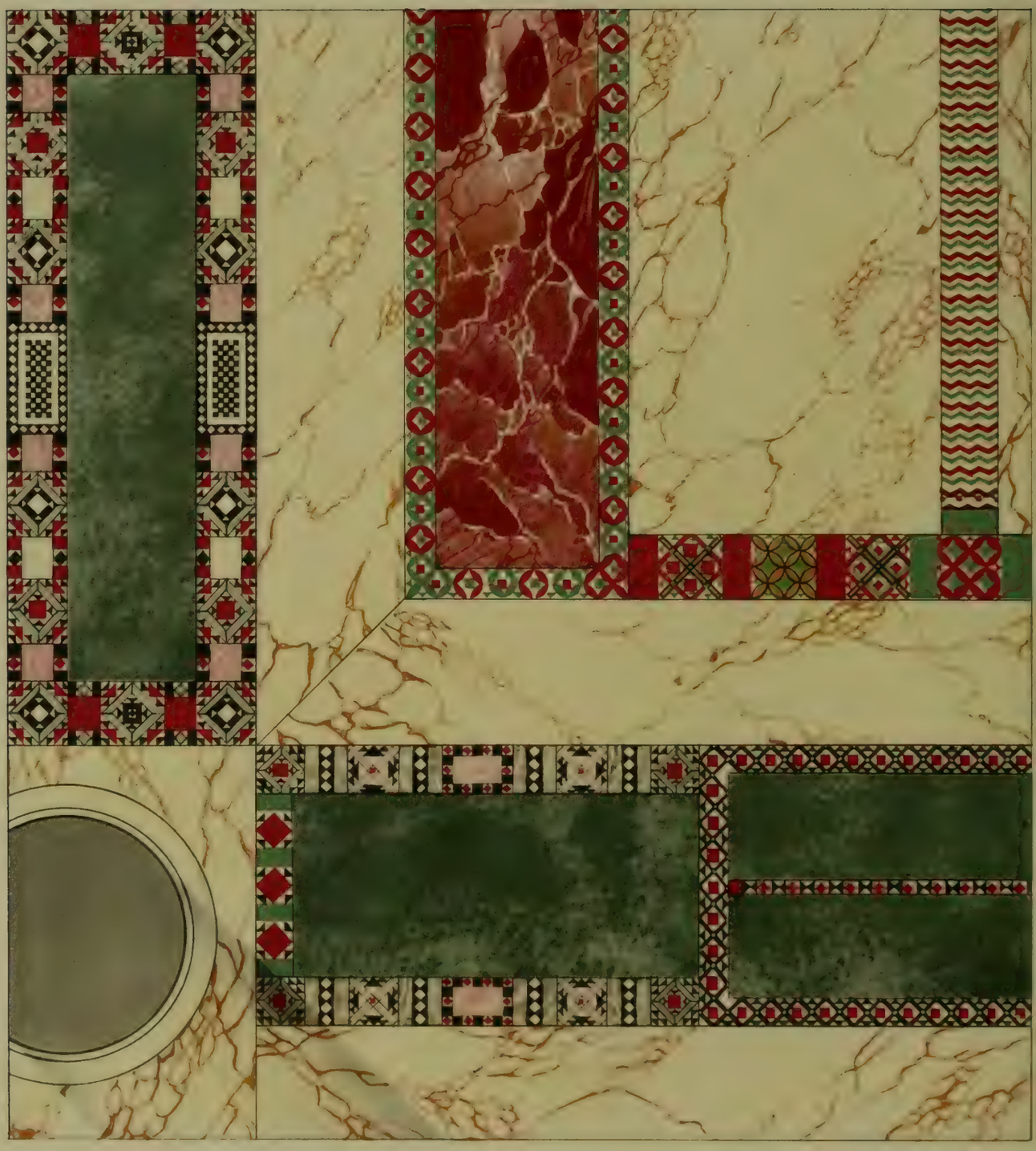
(Continued)

One of the earliest polychrome floors definitely recorded we find mentioned in the Book of Esther. The description of the palace of Ahasuerus tells us that there "were white, green, and blue hangings, festooned with cords of fine linen and purple, to silver rings and pillars of marble; the beds were of gold and silver, upon a pavement of red and blue and white and black marble." Whensoever, or by whomsoever, the Book of Esther may have been written, there can be little doubt that the writer was picturing the kind of floor more or less customary in the Persian palaces of the period.

Of several other very early decorated Eastern floors there are fortunately still extant enough remains for us to form some conception of what must have been the original splendor of the compositions to which they belonged. One of these examples is shown in the accompanying illustrations. It is a carved alabaster paving slab from the palace of Ashurbanipal and carries us back to about 650 B.C. In the British Museum there are three of these slabs in a fairly complete state of preservation, along with four or five much broken fragments that evidently formed part of another floor of similar character. The carving is vigorous and the pattern a bold, conventionalized design, partly geometrical, partly floriated. Whether the depressions were once filled with mastic, so that the whole surface of the paving would be smooth, or whether they were unfilled, so that the carved pattern remained in relief, cannot certainly be stated. The slabs are footworn and the edges of the pattern blunted by treading, but that may well have been because the mastic filling wore away quicker than the stone, got loosened and came out of its bed. Exactly the same condition of wear and bluntness of edges once clean cut exists in the carved medieval *dalles* of St. Omer wherever the mastic filling has disappeared, as it has in many instances.

Whether these alabaster floor slabs from Ashurbanipal's palace at Nineveh (Kouyunjik) were filled with vari-colored mastic, or whether the sinkages were merely colored and left unfilled, there can be little question that they were the vehicles of striking polychrome treatment. Indeed, they must have been in order to maintain any consistency or balance with the sculptured wall decoration, for all the mural sculptures of these chambers, when first excavated, indicated a scheme of brilliant polychromy, although nearly all traces of pigment soon fell away after exposure to the air. Nevertheless, it is still possible here and there to discover minute bits of remaining color. Some other carved alabaster paving slabs of the same period, discovered at Khorsabad, are in the Louvre.

Painted stucco, as a medium of floor polychromy, from its very nature seems too impermanent a substance to commend itself for either present experiment or emulation. Yet the instance of painted stucco floors, previously alluded to, carries our survey of multi-colored paving back to about 1400 B.C. These floor paintings on plaster were discovered by Sir W. M. Flinders Petrie in Egypt at Tell el Amarna. A line drawing of one of the floors is shown amongst the illustrations. The pavements, we are told, "were formed by laying a floor of mud bricks on the soil, covering them with a coat of mortar or fine concrete, about half an inch to an inch thick, so as to produce a level surface; and then facing that with fine plaster mixed with hair about one-eighth of an inch thick, on which the painting was executed. The colors were laid on while the plaster was wet, and even while it could still be moved with the brush. The long lines of the design were marked by stretching a string, and pressing it upon the still soft plaster. After painting, the whole surface was polished and water-proofed, as seen on a portion which was well protect-



MARBLE FLOOR IN HOSIOS LOUKAS MONASTERY, GREECE

CORNER DETAIL

ed." . . . At one point there was "a small portion of a previous pavement, which had become worn, and was broken up to lay the present floor." Periodic renewal seems to have been expected where such floors were used.

It is to be noted that the design contains no geometrical patterns and no conventionalized forms—save an approximation in the border—and that the treatment is thoroughly naturalistic to the full competency of Egyptian expression. The coloring, though spirited and varied, is generally soft in tone. A "black border, around the blue tank of fish and lotus, represents the black mud of the soil; whereas the plants have a yellow band beneath them indicating the sand." . . . "The colors used for this work are entirely mineral. The blues and greens are all of artificial frits . . . ; the reds are burnt yellow ochres, and the yellows are raw yellow ochres . . . ; and the black is doubtless soot, from the fineness of it. The use of half tints and shading off of the colors is frequent on the calves, the birds and the fishes." When seen in merely black and white, the pattern seems crowded, complex and not at all convincing; seen in color, the effect is altogether different, and the elements of the composition assume their true relative values. In other words, the color alone saves the day.

The only polychrome floors of antiquity of which we have satisfactory remains—in point of number, variety, or completeness of preservation—are the mosaic pavements. Of these good examples are to be found all the way from Asia Minor to England, and fresh specimens are coming to light from time to time. Furthermore, this method of paving has experienced such a common revival that everyone is reasonably familiar with its characteristics. Nevertheless, comparatively few people thoroughly realize the full range of polychrome effects of which mosaic paving is susceptible.

We shall do no more here than call attention to the terminology usually applied to various polychrome mosaic floors. The word *mosaic* indicates a pattern formed by fitting together many pieces of marble, opaque glass, colored clays or other substances, generally in small units. The classification of mosaic-work flooring includes (1) *opus tessellatum*, which consists of small cubes or *tesserae* of marble, stone, or baked clay, regularly set in simple patterns; (2) *opus vermiculatum*, which consists of cubes or *tesserae* of marble, stone, or baked clay, often necessarily of irregular shapes, so laid as to produce a pictorial effect, frequently of elaborate composition; (3) and *opus sectile*, which is a sort of marqueterie wrought in marble or other colored substances, so disposed as to produce pictures and patterns.

The *opus vermiculatum* is that branch of the mosaic art most commonly met with in classic antiquity, and most frequently seen in the modern revivals. An highly significant sub-division of the *opus sectile* is the *opus Alexandrinum*, so called from its reputed invention at Alexandria during the Roman period. It is generally composed of squares, roundels, lozenges and other shapes of red and green porphyry, in combination with a number of smaller units of marble or other substances, the whole floor being laid off in geometrical bands and borders of great diversity and often of intricate design.

Opus sectile was not only a favored form of floor decoration throughout many centuries, but was also to be found over a wide range of territory. Furthermore, it lent itself kindly to the most varied forms of expression in pattern and color alike. Starting with the popularity of the *opus Alexandrinum*, in that form and in related phases it recurs again and again until it reaches its climax of chromatic brilliance in the seventeenth century when the Italian *tarsiatori* ran the whole gamut of color with marble inlay cut adroitly in bold Baroque designs. For these creations they drew upon all the many-hued marbles of Italy, and supplemented their stone palette with importations of the rich quarries of northern Africa, as well as with supplies of malachite and lapis lazuli from a greater distance.



MARBLE FLOOR IN HOSIOS LOUKAS MONASTERY. GREECE

DETAILS. SCALE 1/6.

ARCHITECTURAL RECORD SERIES.
POLYCHROME FLOORS
ANDRÉ LECONTE, MES ET DEL.

THE ARCHITECTURAL RECORD

AN ILLUSTRATED MONTHLY MAGAZINE OF ARCHITECTURE & THE ALLIED ARTS & CRAFTS

VOLUME 67 APRIL · 1930 NUMBER 4

THE NEW SCHOOL FOR SOCIAL RESEARCH, NEW YORK CITY

JOSEPH URBAN, ARCHITECT

BRINGING LIGHT INTO CLASSROOMS

One of the main problems of the low city building is to secure the maximum of exterior light. To this end the walls of all classrooms facing the street are of glass. A horizontal scheme of fenestration permits of a wider, more even distribution of light in the interior. To extend the penetration of light further into the rooms the parapets at the floor levels are cantilevered, and the glass is continued as part of the partitions up to the piers.

•

DESIGN SCHEME

On the exterior the cantilever construction reaches a clarity of expression undisturbed by any apparent connection of supporting solids. The scheme in design is that of a succession of horizontals encasing a composite, vertical space. The color is black enframing a creamy, white mass. Black is carried through the white mass in horizontal bands the width of the structural unit, which is brick. This further repetition of a horizontal component in the vertical mass not only emphasizes the structural material but also reaches the entire scheme of the facade. It is the conception carried to its minutest detail.

PLAN DISTRIBUTION

The study niches are on a mezzanine back of the auditorium. On the facade they are expressed by higher placing of the windows than elsewhere. The room is shallow. Wall space for charts and maps is a necessity, distraction from outside is undesirable. The room is kept as an open unit of space divided near the level of the eye into groupings for four or five persons. The atmosphere of intimacy of discussion is contrived without the disadvantage of the closeness of small rooms. It is also possible for a single speaker to command all the groups at one time.

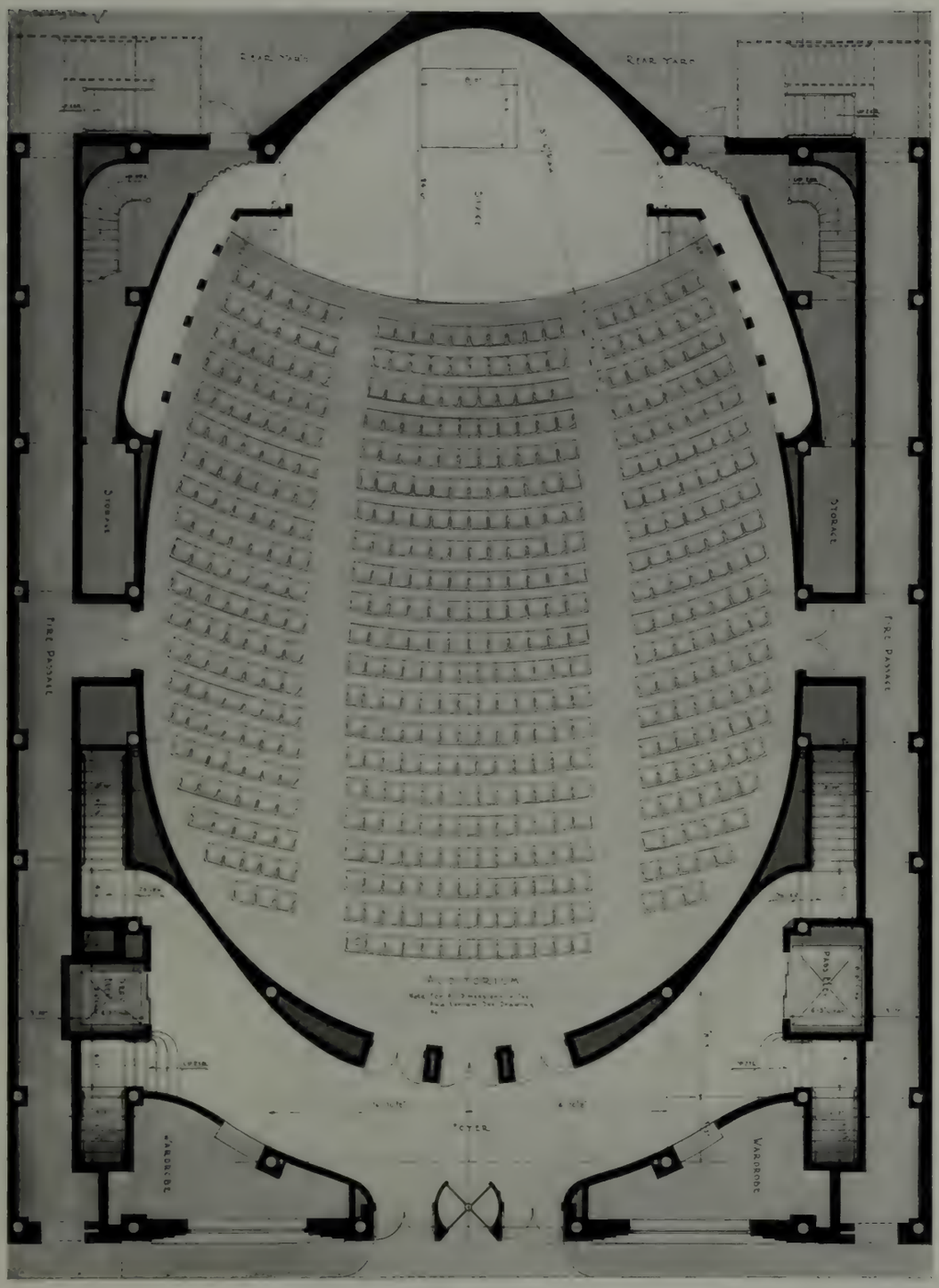
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AUDITORIUM

The auditorium is planned for maximum visibility and audibility for the greatest practicable number of persons seated on one level. Furthermore the variability of its use as theatre, lecture and concert hall necessitates corresponding flexibility of character. This is effected by foregoing any decorative scheme other than the special proportion of the room and the manner of illumination. Light sources are concealed in the concentric ribs of the vault and illuminated toward the stage. In the ribs over the auditorium and away from the stage are placed the air vents.



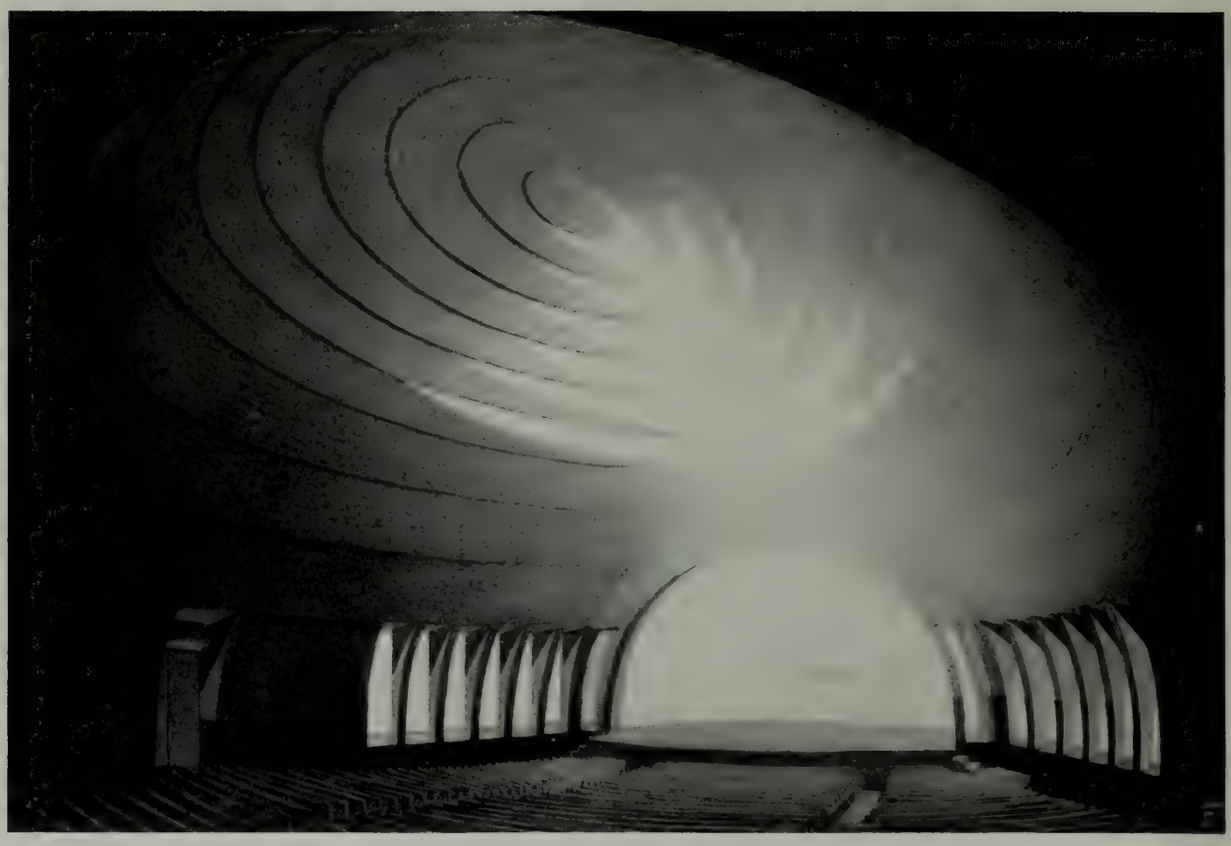
NEW SCHOOL FOR SOCIAL RESEARCH
NEW YORK CITY
JOSEPH URBAN, ARCHITECT



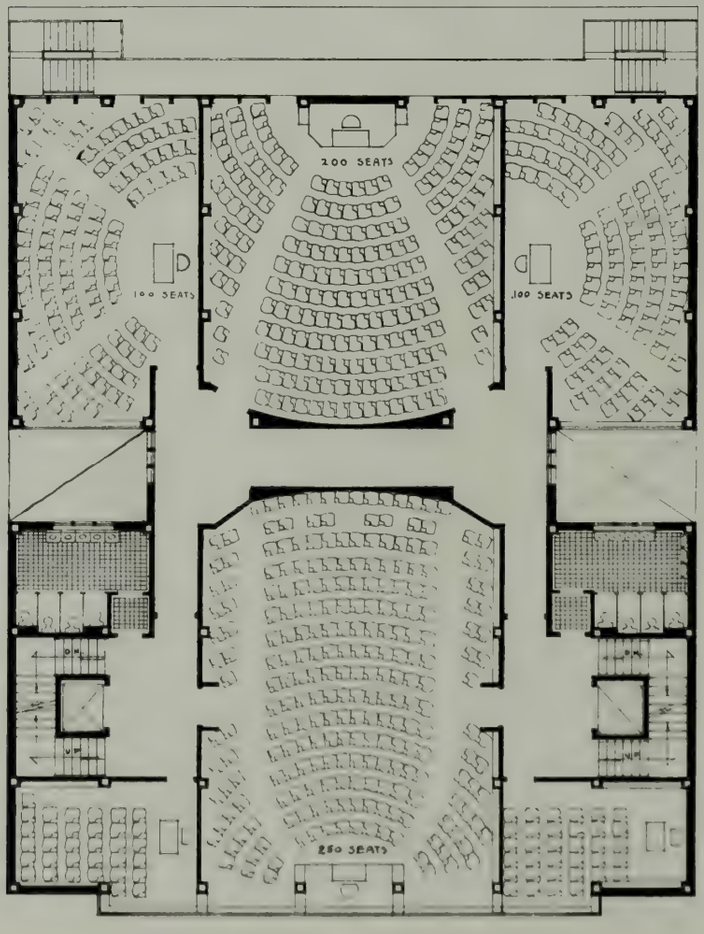
PLAN OF MAIN AUDITORIUM
NEW SCHOOL FOR SOCIAL RESEARCH
NEW YORK CITY
JOSEPH URBAN, ARCHITECT

With the stage cut off from the auditorium by screens, the apron becomes a speaking rostrum. The speaker is enclosed within the walls of the room occupied by the audience. Or, with the stage in operation, the action can spread along side wings and partially encircle the audience. The variety of mood and effect made possible by modern lighting within this simple shell is incalculable. At the present time it is difficult to imagine a more chaste solution of varied conditions and one more inspiring to a development of new dramatic technique, than the auditorium of the New School for Social Research.

SHEPARD VOGELGESANG.



MAIN AUDITORIUM



NEW SCHOOL FOR SOCIAL RESEARCH
NEW YORK CITY

JOSEPH URBAN, ARCHITECT

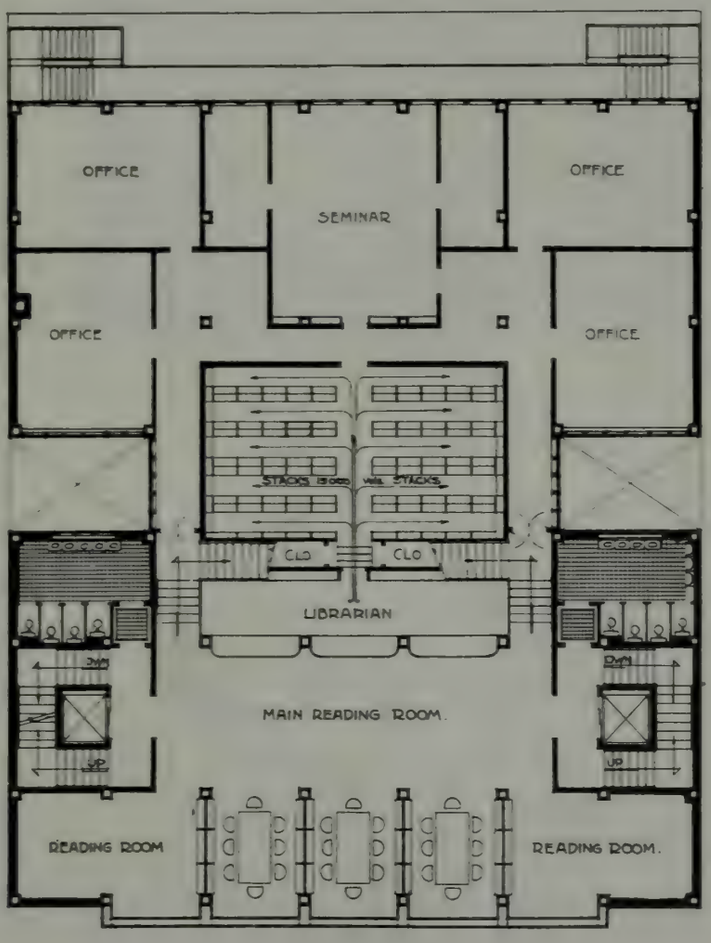
PLAN OF SECOND FLOOR



"TALK-OVER" NICHES ON MEZZANINE FLOOR

NEW SCHOOL FOR SOCIAL RESEARCH
NEW YORK CITY

JOSEPH URBAN, ARCHITECT



PLAN OF FOURTH FLOOR

THE CAMDEN, N. J., CITY HALL PLAN

EDWARDS AND GREEN, INC., ARCHITECTS

An unusual preliminary survey conducted by Professors Warren Powers Laird and Lewis F. Pilcher

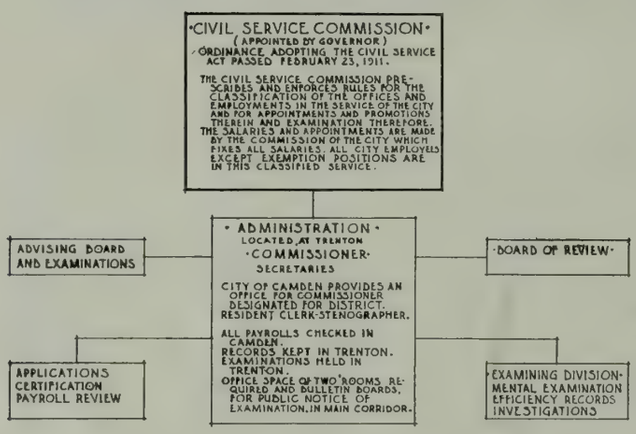
BY ARTHUR T. NORTH

THE commission form of city government is a marked change from the prevailing form, and a city hall designed for the new condition is of architectural interest. When the method used for developing the plan for a suitable city hall is unusual, the interest is further increased. Such an instance is that of the recent action of the City of Camden, New Jersey.

The commission form of city government was adopted by Camden in 1923 and the new form of government was set up in the existing city hall. This building was entirely inadequate for the purpose. The commission, June 1928, authorized a survey and recommendations for the location and the requirements for a new city hall. It retained Professor Warren Powers Laird, University of Pennsylvania, for that purpose. On his request Professor Lewis F. Pilcher, University of Pennsylvania—former State Architect of New York—was associated in the work.

These gentlemen had previously made a similar survey and recommendations for the Board of Freeholders of Camden County pertaining to a new court house annex which was to be constructed on a portion of a city block adjacent to the court house, the site owned by the county. After a survey of the local conditions appertaining to the city hall problem, it was recommended that the city condemn and acquire title to the balance of the city block and build a city hall jointly with the court-house annex. The unoccupied portion of the property is intended to be utilized as a plaza, appropriately parked. It was also recommended that a small triangular city block contiguous to the proposed plaza be condemned to increase it. An underground bus terminal is also to be constructed under the plaza. These recommendations are particularly appropriate to the street traffic conditions which are affected by the great volume of vehicular traffic originating at the nearby Delaware River Bridge Plaza. The recommendations were accepted and the necessary legislation enacted.

An understanding of the nature and scope of the survey and recommendations, the labor required for research, analysis and planning, and its function in a rational method of procedure is best obtained through a detailed description of the production process.



PLANS FOR CIVIL SERVICE COMMISSION

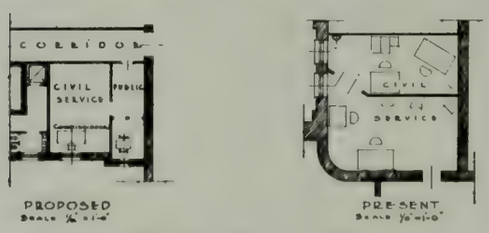


CHART AND PLANS

CAMDEN, N. J., CITY HALL

EDWARDS AND GREEN, INC., ARCHITECTS

The plan (left, below) incorporates the actual needs of the department in question, as ascertained through the analysis indicated by the chart (above)

Following the survey of the local conditions which determined the location of the new city hall, a study was made of the city charter and the state commission government law of 1917. This analysis was recorded in the form of charts. These charts indicate the sources of authority, the functions of every constituent bureau, and the personnel and equipment required for its operation.

The basic or "key" chart describes the organization of the board of commissioners, which elects one of its members to be mayor. It has authority to legislate, adjudicate and administer all affairs of the city of Camden. Each bureau or activity is allocated to one of the five departments prescribed by law, and each of the commissioners is assigned as a director of a department. The mayor is ex-officio director of the Department of Public Affairs. The five departments and their constituent bureaus are:

I. Department of Public Affairs
- City Clerk
- City Counsel
- Bureau of Health
- Bureau of Charities

II. Department of Revenue and Finance
- Comptroller
- Receiver of Taxes
- Board of Assessors
- Purchasing

III. Department of Public Safety
- Police Dep't.
- Fire Department
- Recorder's Court
- Plumbing Inspector
- Weights and Measures
- Electrical Bureau
- Building Inspector

IV. Department of Streets and Public Improvements
- Water
- Sewers
- Streets
- Municipal Construction

V. Department of Parks and Public Property
- Bureau of Audit and Accounts
- Bureau of Parks
- Bureau of Public Property

In addition to the five departments, the city provides quarters for the Civil Service Commission, the Public Utilities Commission and the District Court, appointed by the governor, and the Board of Education, appointed by the mayor.

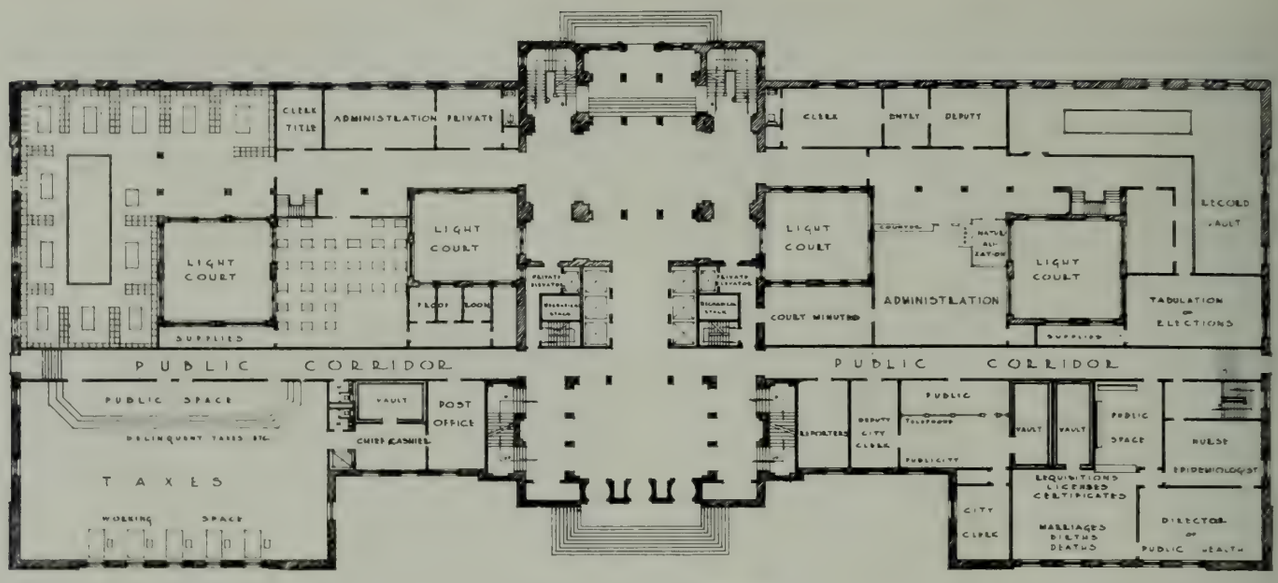
Three kinds of charts were made—organization of the board of commissioners, organization of each department, and organization of each department constituent bureau. Each of the five department charts describes the functions of its commissioner-director, the headquarters personnel and also in general each constituent bureau.



RENDERING
CAMDEN, N. J., CITY HALL
EDWARDS AND GREEN, INC., ARCHITECTS

Each bureau chart describes in detail its responsible director, its functions, personnel and working requirements. These charts visualize the complete scheme of city government, the relations of each bureau to the others severally and jointly. These relationships to the city government and the nature of its contacts with the public were the controlling factors in determining the location and plan of each bureau quarters.

The working routine, methods, processes and equipment of each bureau were studied.



PLAN OF MAIN FLOOR

CAMDEN, N. J., CITY HALL

EDWARDS AND GREEN, INC., ARCHITECTS

The chief considerations were those of efficiency and convenience, not of axes and imposing entrances

A detailed plan of its present quarters was made showing the rooms, location of furniture and equipment. Data were procured and studied pertaining to the relation of work required to the population.

Based on these data and the conclusions formed, a plan was made for housing each bureau in the new city hall with provisions for the inevitable increase in population and public business. In making these tentative plans the city bureau was considered in its plan aspect as a place in which to conduct the public business in the most convenient and efficient manner. This involved providing light, ventilation, suitable working spaces, convenient public spaces, vaults, private offices and other features appertaining to the particular governmental unit. A comparison of the new and the existing plans discloses the utter lack of scientific planning of the present quarters.

It was recommended to convert the present city hall into a general police headquarters and city jail. Detailed plans were made of the building with its equipment. Tentative plans were made for its use as police headquarters and jail.

Plans were made showing the units assembled in a building used as a joint city hall and court house annex. The various bureaus are located in accordance with their contacts with the public—convenience being the first requirement. Each commissioner as such and as a department director has offices which occupy an entire floor of the tower portion of the building which belongs to the city.

Both buildings have the elevators, the elevator lobbies, the heating and power plant in common; otherwise they are separated by an unbroken wall, each building having its own circulation corridors. Provisions are made in the upper parts of the tower for a municipal broadcasting station, a carillon, a four-face tower clock and beacon lights and electrical impulses for the guidance of aviators.

The joint county-and-city building is very simple in design. It will be a dignified and impressive building. All exposed surfaces of the exterior walls are faced with a gray granite. The granite is secured from two widely separated quarries, each providing one-half of the required quantity. There is no apparent color or texture

difference which distinguishes one from the other. This division of the granite contract insures delivery of the material as needed.

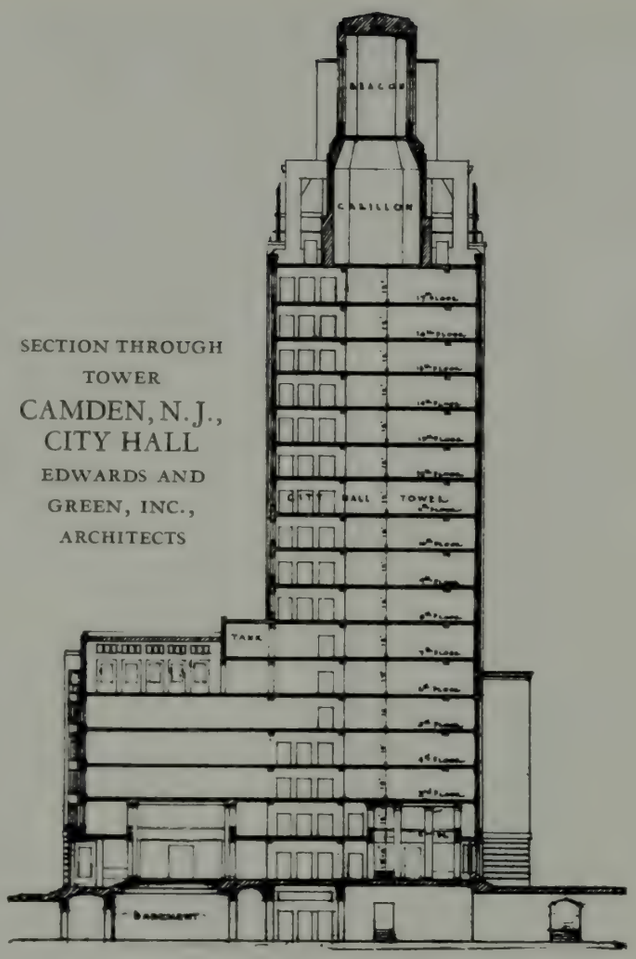
The county survey was authorized November 1927, the city survey June 1928. The contract for test borings was let June 1928; contracts for foundations let October 1928; general contract, complete, let April 1929; completion of the structure June 1930. The contract prices did not exceed the estimated costs included in the surveys.

The Board of Freeholders of Camden County and City Commissioners of Camden retained Edwards and Green, Inc., architects, and Professor Lewis F. Pilcher, associate architect, to prepare the plans and supervise the construction of the building.

This is an instance of an unusual method employed in the planning of public buildings. It is a distinct departure from the usual program of architectural competitions for public buildings in which an "architectural advisor" sets up the program of requirements. In this case the consultants prepared 6 maps, 22 organization charts, 15 combined old and new bureau plans, 17 assembled floor plans—a total of 60 sheets of maps, charts and plans. In addition there were submitted tentative elevations, a section and perspective of the building showing its relation to the proposed plaza, and a comprehensive written report.

The volume of work and the intensive study given to the project by the consultants and the cooperation given by the officials is unprecedented, but justified by the results. The primary importance of the plan is demonstrated with the architectural design of the exterior and public lobbies as of secondary importance. The architectural design was evolved from the plan in a logical manner.

The studies of street traffic, plans for its routing, the underground bus terminal and landscape treatment are in process.



SECTION THROUGH TOWER
CAMDEN, N. J., CITY HALL
EDWARDS AND GREEN, INC., ARCHITECTS



THE DEPARTMENT OF STREETS AND PUBLIC IMPROVEMENTS
CAMDEN, N. J., CITY HALL
EDWARDS AND GREEN, INC., ARCHITECTS



PLOT PLAN

FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.

CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS

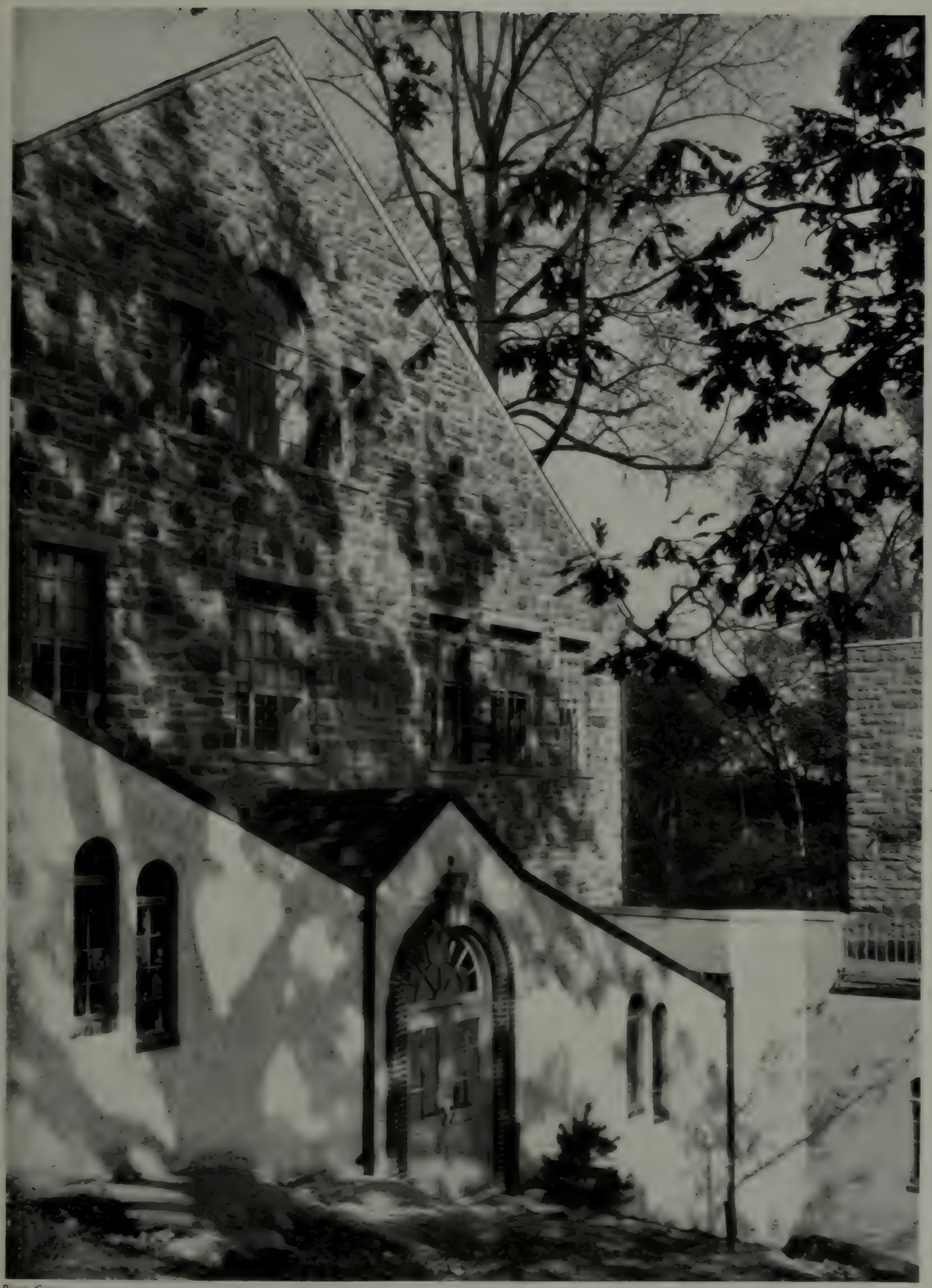


Photo. Grant

ENTRANCE TO ART BUILDING

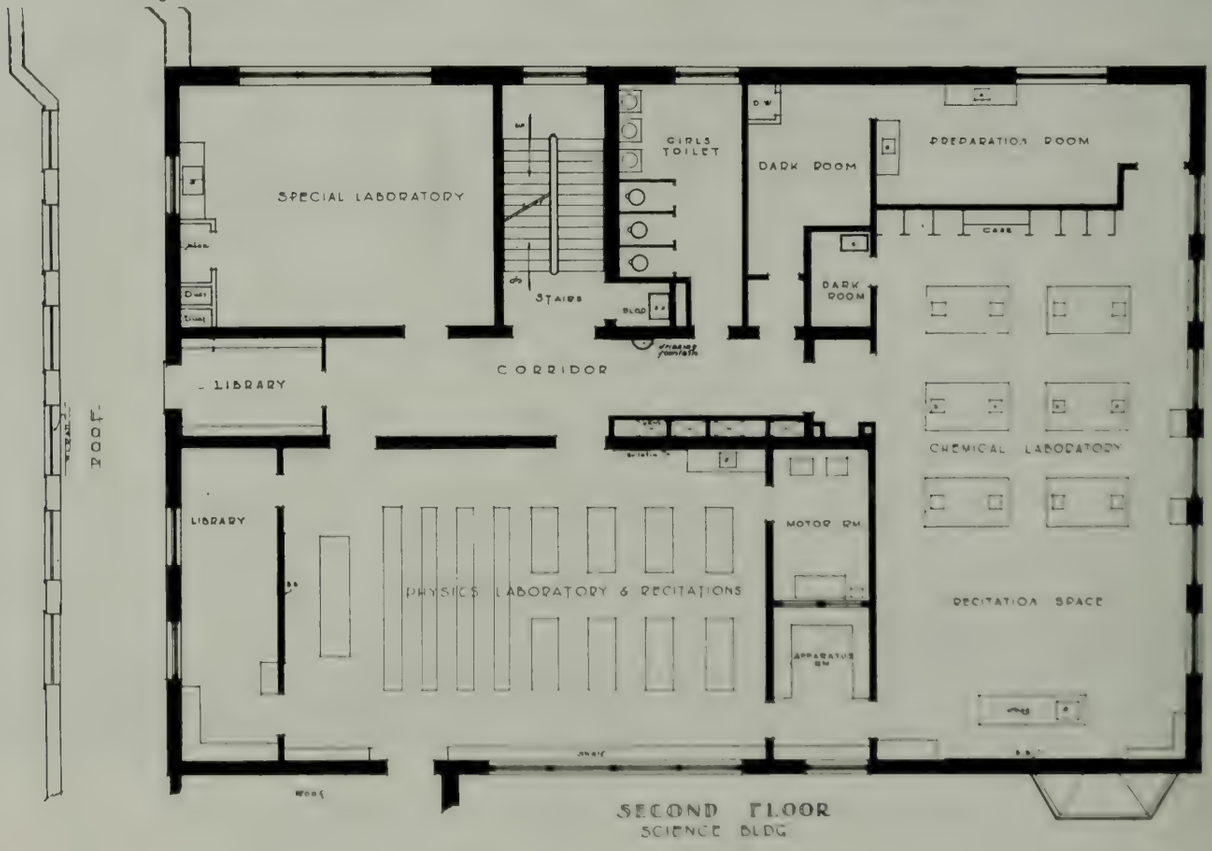
FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.

CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS



Photo. Grant

JUNIOR HIGH SCHOOL — SCIENCE



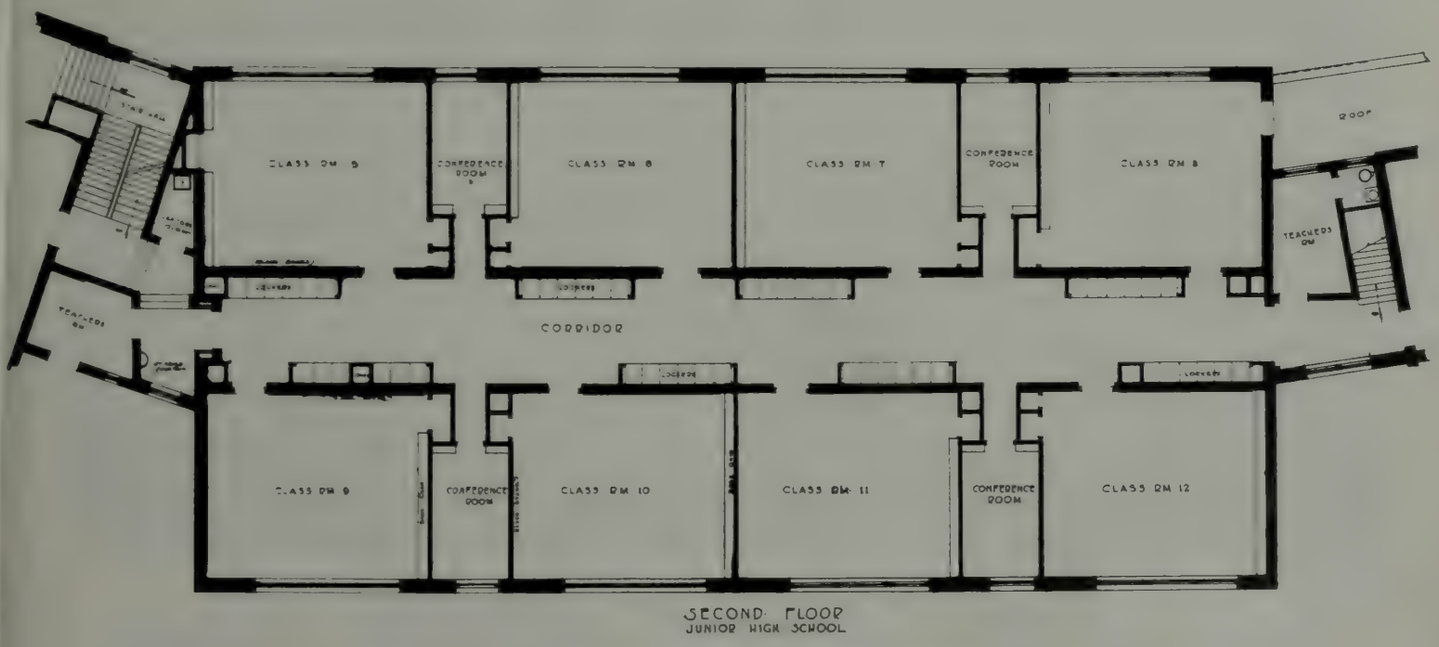


ADMINISTRATION LIBRARY

ABOVE, BOTH PAGES, PANORAMA

FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.

CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS



SECOND FLOOR
JUNIOR HIGH SCHOOL

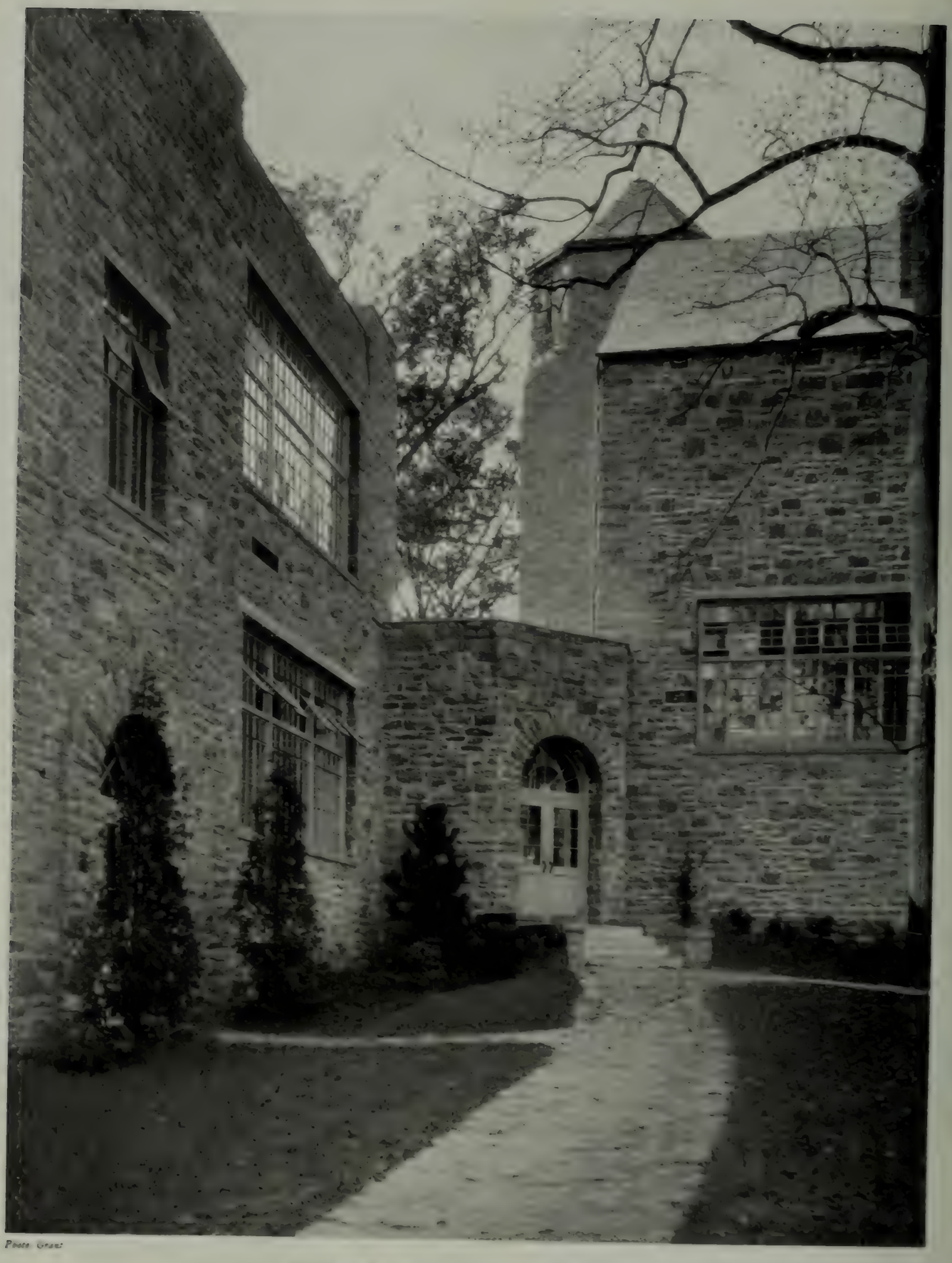


Photo Gross

ENTRANCE TO ADMINISTRATION BUILDING
FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.
CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS



Photo. Grant

GYMNASIUM AND DINING HALL

FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.

CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS

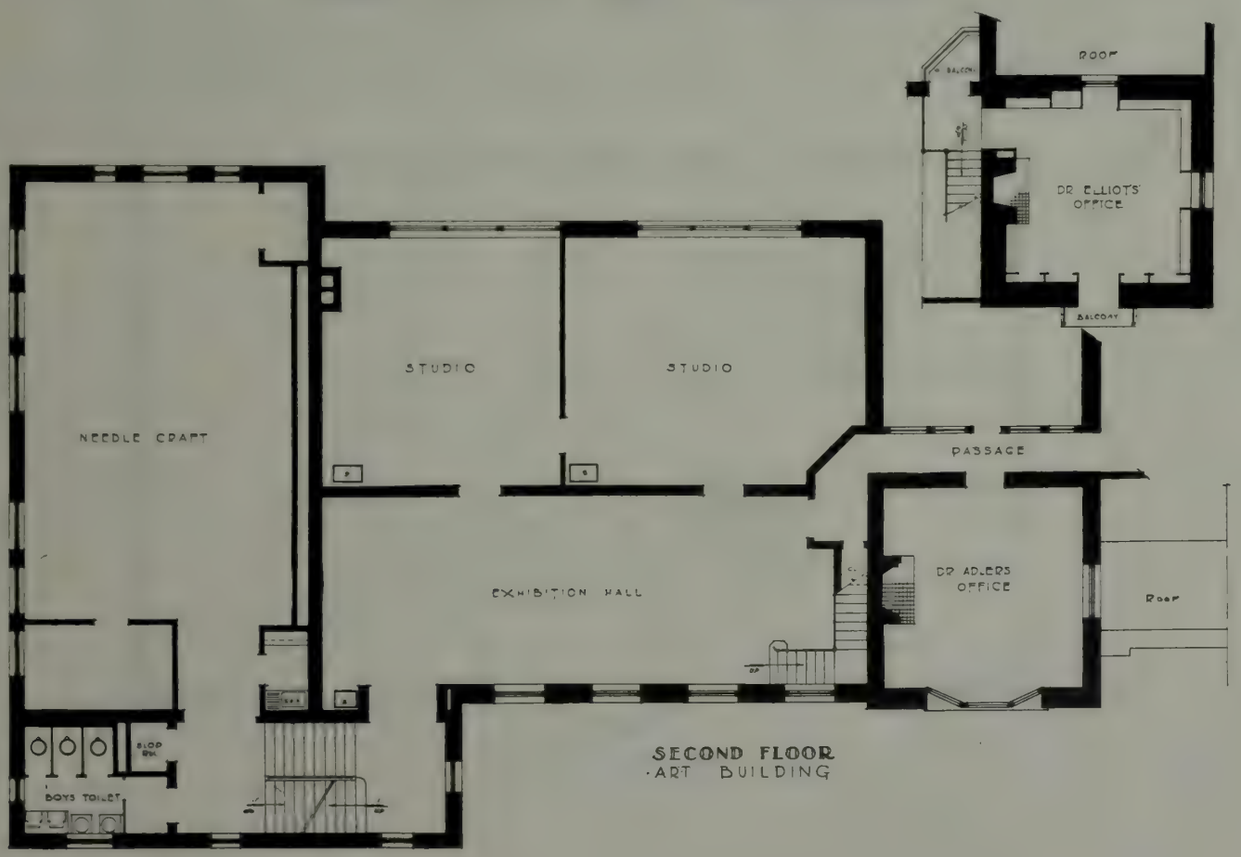




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INTERIOR OF DINING HALL

FIELDSTON SCHOOL, RIVERDALE-ON-HUDSON, N. Y.

CLARENCE S. STEIN AND ROBERT D. KOHN, ARCHITECTS



SECOND FLOOR
ADMINISTRATION BUILDING

PORTFOLIO
OF
CURRENT ARCHITECTURE



Photo. Gottscho

ONONDAGA GOLF AND COUNTRY CLUB, FAYETTEVILLE, N. Y.
PEABODY, WILSON AND BROWN, ARCHITECTS

FEATURING
COUNTRY CLUBS
SMALL HOUSES



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ONONDAGA GOLF AND COUNTRY CLUB, FAYETTEVILLE, N. Y.

PEABODY, WILSON AND BROWN, ARCHITECTS





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PEABODY, WILSON AND BROWN, ARCHITECTS





ONONDAGA GOLF AND COUNTRY CLUB, FAYETTEVILLE, N. Y.
PEABODY, WILSON AND BROWN, ARCHITECTS



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ONONDAGA GOLF AND COUNTRY CLUB, FAYETTEVILLE, N. Y.

PEABODY, WILSON AND BROWN, ARCHITECTS



Photo Thompson

HOLSTON HILLS COUNTRY CLUB, KNOXVILLE, TENN.

BARBER AND MCMURRY, ARCHITECTS



GENERAL VIEW



Photo. Thompson

LOGGIO AND SHOP

HOLSTON HILLS COUNTRY CLUB, KNOXVILLE, TENN.

BARBER AND MCMURRY, ARCHITECTS



Photo. Thompson

LOUNGE

HOLSTON HILLS COUNTRY CLUB, KNOXVILLE, TENN.

BARBER AND MCMURRY, ARCHITECTS

MAIN FLOOR PLAN

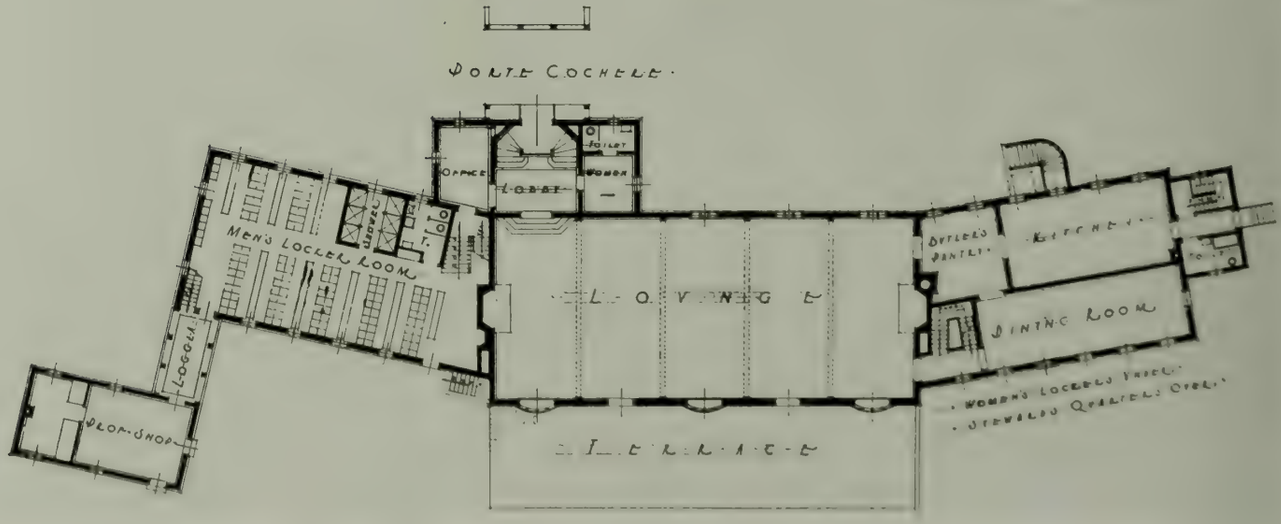




Photo. Gillies

TERRACE

HOUSE OF MR. WALDRON FAULKNER, BRONXVILLE, N. Y.

WALDRON FAULKNER, ARCHITECT



Photo. Gillies

ENTRANCE

HOUSE OF MR. WALDRON FAULKNER, BRONXVILLE, N. Y.

WALDRON FAULKNER, ARCHITECT

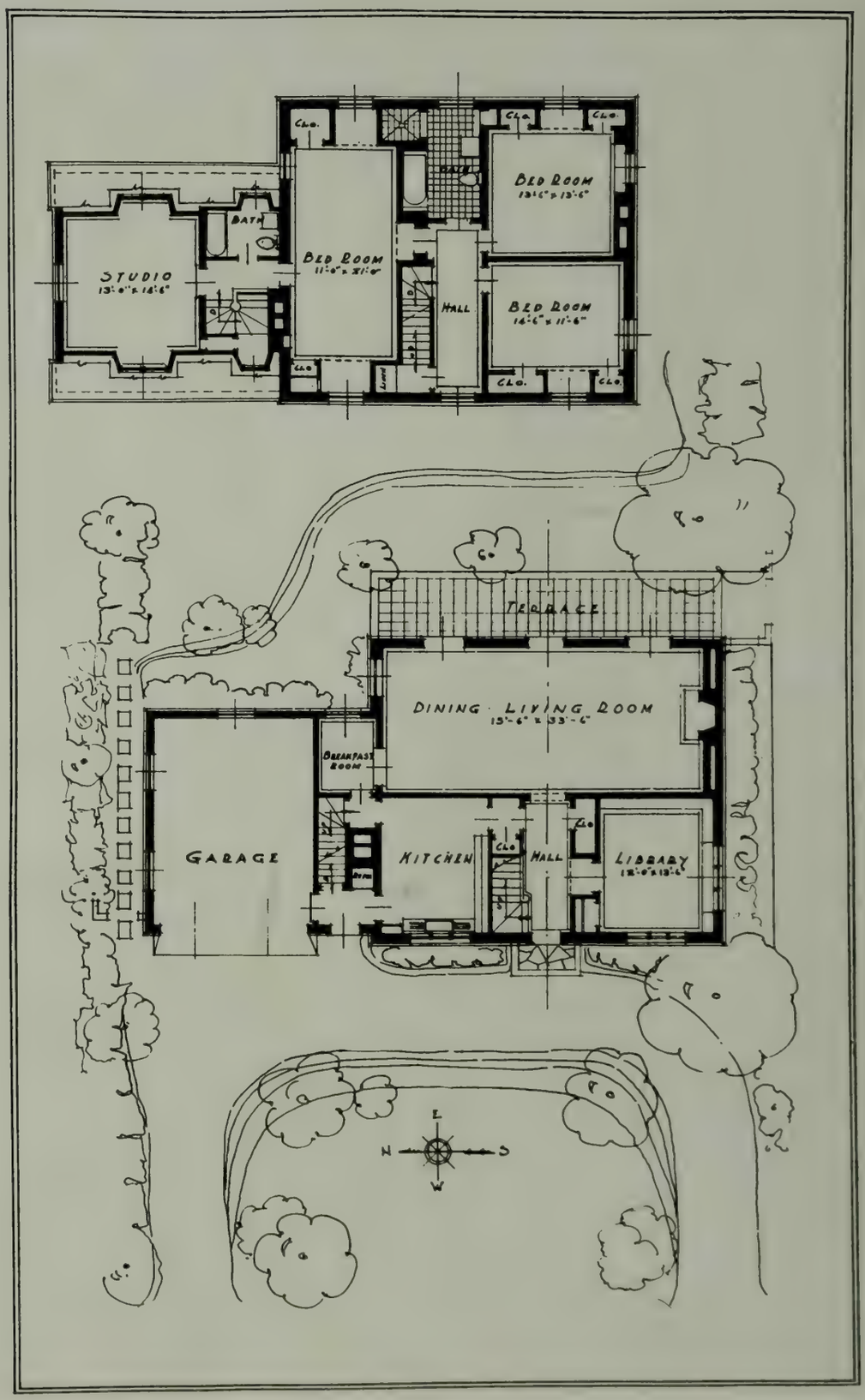


Photo. Gillies

FIREPLACE, OWNER'S ROOM

HOUSE OF MR. WALDRON FAULKNER, BRONXVILLE, N. Y.

WALDRON FAULKNER, ARCHITECT



PLANS

HOUSE OF WILLIAM A. KITTREDGE, EVANSTON, ILL.

A. ERWIN NICOLAI AND RALPH E. STOETZEL, ARCHITECTS



Photo. Gerlach

VIEW FROM GARDEN



Photo. Gerlach

VIEW FROM STREET

HOUSE OF WILLIAM A. KITTREDGE, EVANSTON, ILL.

A. ERWIN NICOLAI AND RALPH E. STOETZEL, ARCHITECTS

Construction of common brick painted white. Cedar shingle roof stained light brown. Wood casement windows; sash painted Chinese orange red, in black frames. Iron grills painted black. (Lot size 70′ x 150′. House and garage 60′ long.)



Photo. Gerlach

MAIN ENTRANCE ON DRIVEWAY

HOUSE OF WILLIAM A. KITTREDGE, EVANSTON, ILL.

A. ERWIN NICOLAI AND RALPH E. STOETZEL, ARCHITECTS

Walls of common brick painted white. Door and shutters black. Plain lighting fixtures



Photo. Gottlieb

STAIRWAY FROM BACK HALL TO STUDIO AND KITCHEN BELOW

HOUSE OF WILLIAM A. KITTREDGE, EVANSTON, ILL.

A. ERWIN NICOLAI AND RALPH E. STOETZEL, ARCHITECTS

Sand plaster walls. Stair treads shellacked. Wood trim, lemon yellow



Photo. Gerlach

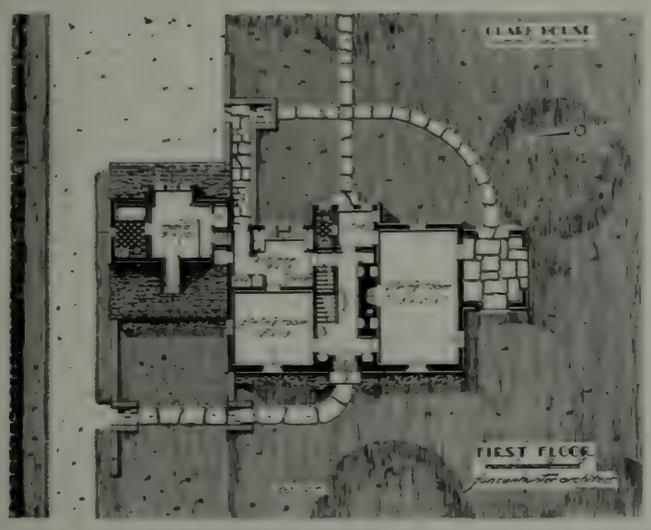
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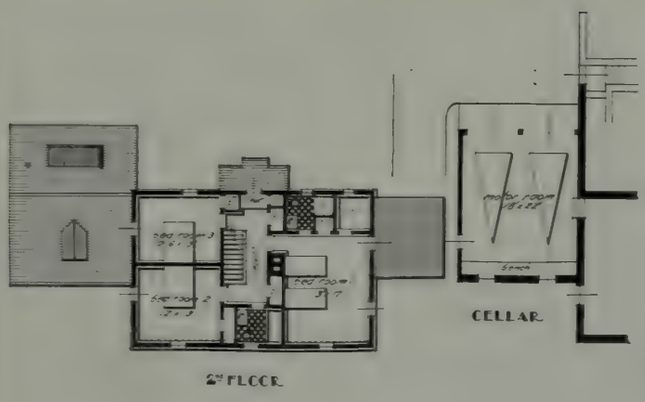
HOUSE OF WILLIAM A. KITTREDGE, EVANSTON, ILL.

A. ERWIN NICOLAI AND RALPH E. STOETZEL, ARCHITECTS

Floor of oak dark stained. Cases, doors and paneling of birch oiled and waxed. Plaster walls, below moulding, deep blue; above moulding and ceiling, plain sand plaster







HOUSE OF HOWARD A. CLARK, SUMMIT, N. J.

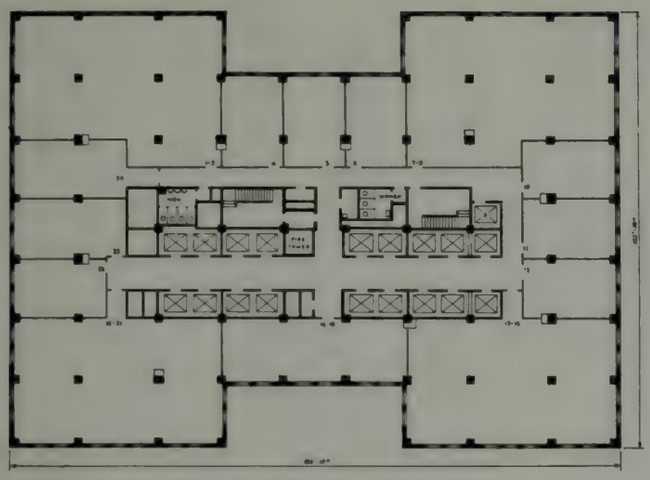
DUNCANHUNTER, ARCHITECT



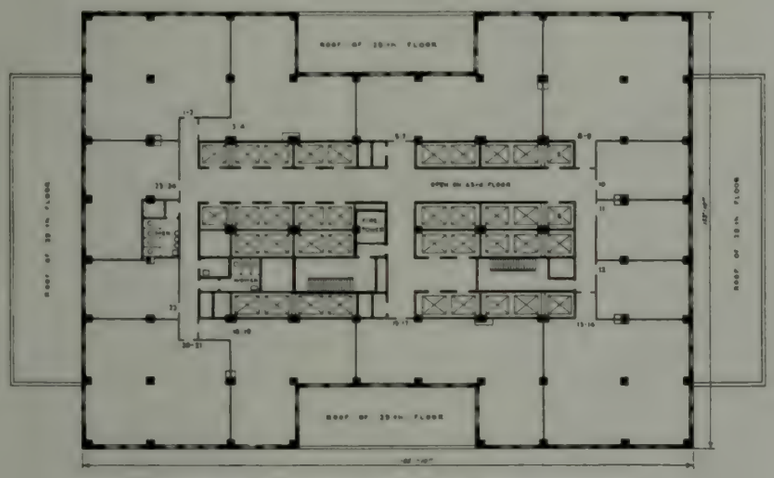
ENTRANCE

HOUSE OF HOWARD A. CLARK, SUMMIT, N. J.

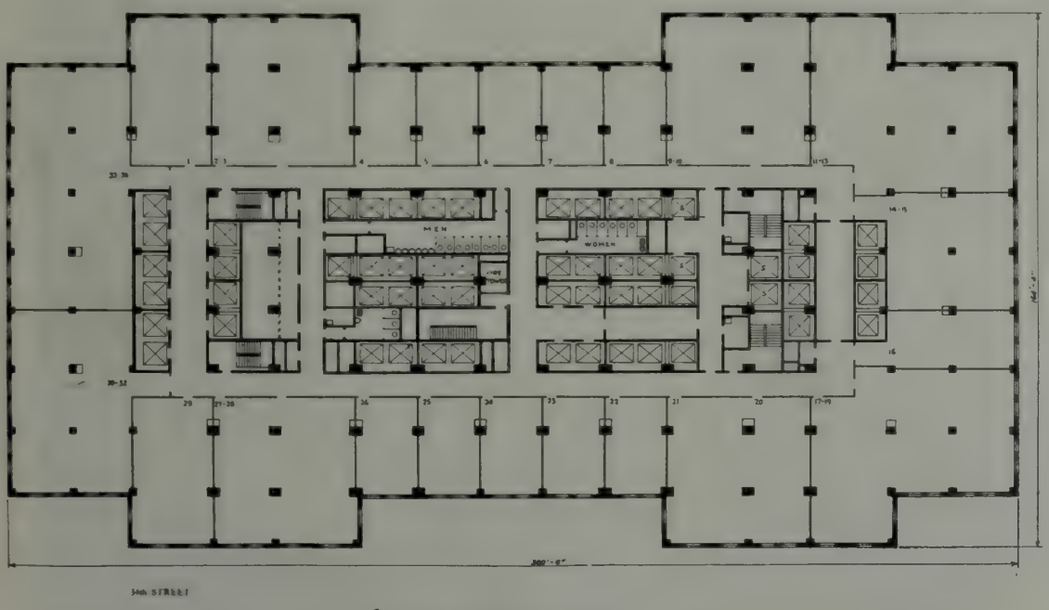
DUNCANHUNTER, ARCHITECT



66TH AND 67TH FLOORS



30TH AND 32ND; 40TH AND 43RD FLOORS



6TH TO 20TH FLOORS

THREE TYPICAL FLOOR PLANS

EMPIRE STATE BUILDING, NEW YORK CITY

SHREVE, LAMB AND HARMON, ARCHITECTS

(Under construction)

(To go with frontispiece, on next page, of an article on "The Economic Design of Office Buildings," by R. H. Shreve)



PRELIMINARY SKETCH
PERSPECTIVE

EMPIRE STATE
BUILDING,
NEW YORK CITY

SHREVE, LAMB AND
HARMON, ARCHITECTS

(*See plans on back*)

THE ECONOMIC DESIGN OF OFFICE BUILDINGS

BY R. H. SHREVE,

of Shreve, Lamb and Harmon, Architects

THERE are now in existence or in course of construction in New York at least ten buildings fifty stories or more in height and many others approaching this measure.

One of these, the Empire State Building at Fifth Avenue and 34th Street, is to be the largest of its kind in the world. Six months ago the working drawings for this building had not been begun; one year from now it will have been completed, ready for the 20,000 tenants which it is capable of accommodating! A project involving a cost of fifty millions of dollars, containing over two million square feet of usable area in a cube of thirty-five million feet, sustained by a frame composed of fifty thousand tons of steel rising nearly a quarter of a mile above the foundations, is to be designed, erected and completed for occupancy in a brief eighteen months.

Stone from Maine and Indiana, steel from Pittsburgh and Elmira, cement from Pennsylvania and New York, timber from Oregon or the Carolinas, brick from the Hudson River Valley or from the clay pits of Connecticut, glass from Ohio, marble from Vermont or Georgia or Italy, sand from the shores, stone from the hills, materials from all the world must come together and fit together with accuracy of measurement and precision of time if the procession of construction is not to be thrown into confusion, carrying the dollars away in the ruin. One may well believe that with its organized cooperation in the labor of men and the fabrication and placing of materials, its precision of performance to match the timing of a trunk-line railroad and connecting services, almost the powers of Aladdin's genii harnessed for a building project, none of all the ancient world wonders in any way matched the amazing assembly of skilled craft and fashioned materials which with uncanny accuracy find their places in the daily wrought miracle of a modern skyscraper.

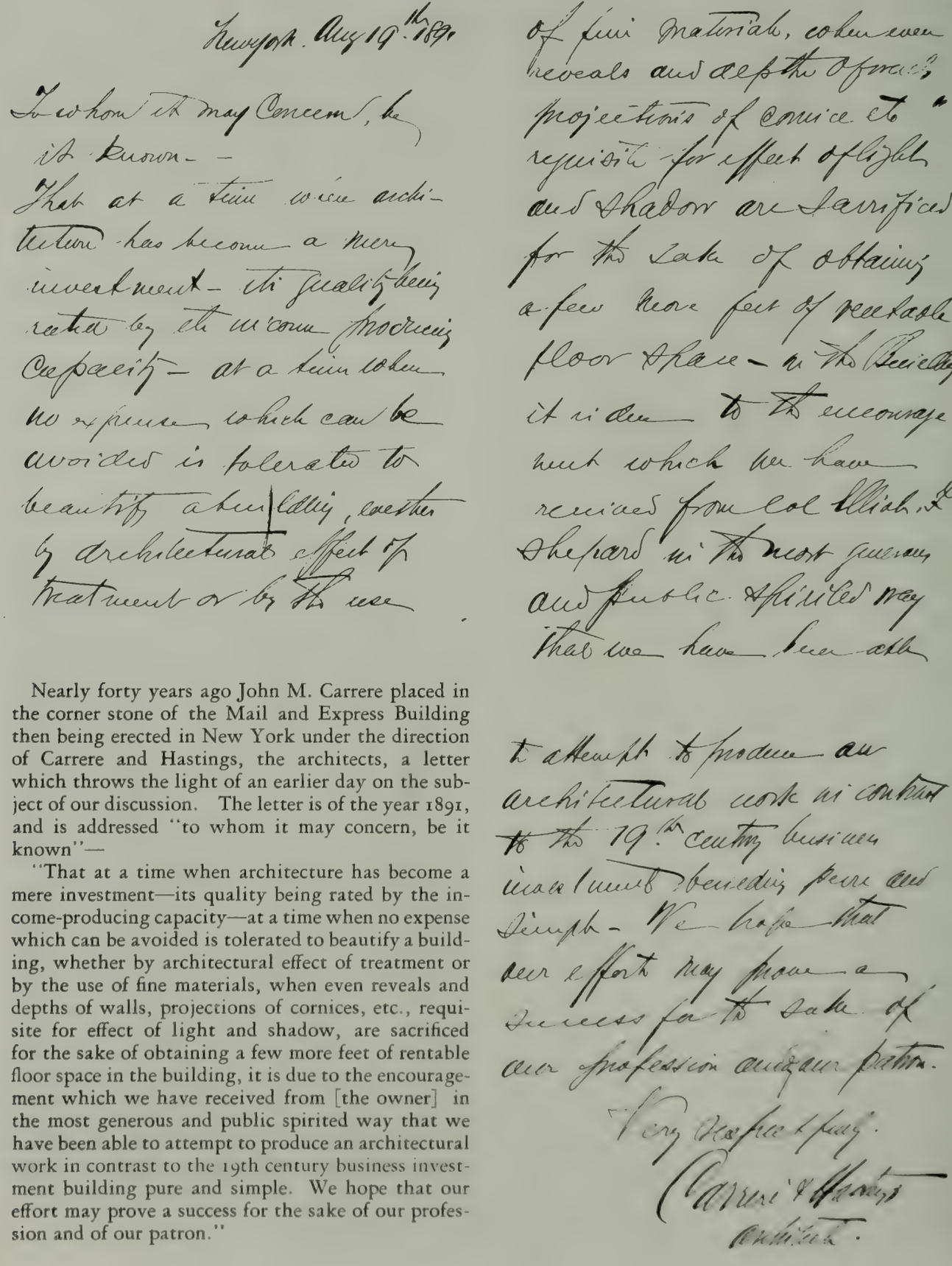
"Why and how is all this made possible?" is the question asked by students of the moving forces of our architectural growth. Even among those most closely identified with the development of the city there are wide differences of opinion as to the place of the skyscraper in any sound scheme of planning. That gracious critic, Mr. Cortissoz, granting that "it is magnificent," asks dubiously "Is it architecture?" Others still are resentful of the intrusion of a cold Martian calculation of values in the field of aesthetic study, and deplore the dominance of these giants of business in one corner of the world of art. Neither these queries nor these protests are new.



LEFCOURT NATIONAL BUILDING,
SHREVE AND LAMB, ARCHITECTS

FACSIMILE COPY

Letter placed in the cornerstone of the Mail and Express Building, New York City, by John M. Carrere in 1891
(For transcript in type, see below)



Newyork. Aug 19th 1891

To whom it may Concern, be
it known—
That at a time when architecture has become a mere investment— its quality being rated by the income producing capacity— at a time when no expense which can be avoided is tolerated to beautify a building, whether by architectural effect of treatment or by the use of fine materials, when even reveals and depths of walls, projections of cornices etc. requisite for effect of light and shadow are sacrificed for the sake of obtaining a few more feet of rentable floor space— in the building. it is due to the encouragement which we have received from Col Elliot F. Shepard in the most generous and public spirited way that we have been able to attempt to produce an architectural work in contrast to the 19th century business investment building pure and simple. We hope that our effort may prove a success for the sake of our profession and our patron.

Very respectfully.
Carrere & Hastings
Architects.

Nearly forty years ago John M. Carrere placed in the corner stone of the Mail and Express Building then being erected in New York under the direction of Carrere and Hastings, the architects, a letter which throws the light of an earlier day on the subject of our discussion. The letter is of the year 1891, and is addressed "to whom it may concern, be it known"—

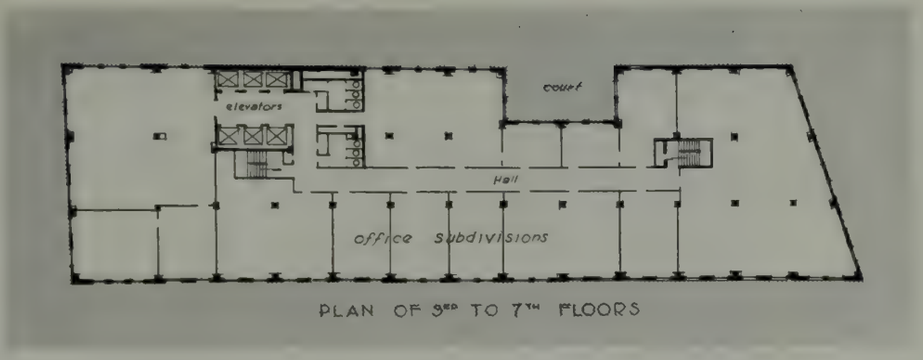
"That at a time when architecture has become a mere investment—its quality being rated by the income-producing capacity—at a time when no expense which can be avoided is tolerated to beautify a building, whether by architectural effect of treatment or by the use of fine materials, when even reveals and depths of walls, projections of cornices, etc., requisite for effect of light and shadow, are sacrificed for the sake of obtaining a few more feet of rentable floor space in the building, it is due to the encouragement which we have received from [the owner] in the most generous and public spirited way that we have been able to attempt to produce an architectural work in contrast to the 19th century business investment building pure and simple. We hope that our effort may prove a success for the sake of our profession and of our patron."

TYPICAL FLOOR PLAN

THE STANDARD BUILDING, ALBANY, N. Y.

SHREVE AND LAMB, ARCHITECTS

This building will be found under (3) in the tabulation of essential plan data for five buildings, on page 358



Whatever may have been the measure of his success, Mr. Carrere's protest was unavailing. Soon after the letter was written, when the building whose birth it signalized was at the age of 25 years, it was torn down to make way for an addition to one of its commercial neighbors requiring more floor space. And today, less than 40 years after the writing of this letter, New York owns many business structures of unquestioned dignity, of "fine materials" and beauty of treatment, and at least one of them will be without "reveals or depths of walls, projections of cornice" or other of the lamented traditions, but with a charm and logic of design marking a distinct advance in art and structure,—at once not a "contrast" but a combination of "an architectural work" and "a business investment building."

If, as Mr. Cortissoz suggests, it may "be necessary some day to invent a new word to designate the new style, a word drawn from the terminology of engineering, with aid from that of the mechanics rather than the art of building," the dominant expression of that word should be borrowed from the principles of sound design and ordered thought.

For so successful has been the effort of the more modern American architects to interpret the demands of economics and to characterize utility and structural form, that we have today in our modern business buildings an expression in architectural style most encouraging to the fine art of building. These structures are the response to business standards and business demands, and they must meet certain established tests if they are to be considered successful, and are to survive either as individual buildings or as a type.

Today, as in Carrere's day, the modern office building presents a challenge to architecture in the problem of enclosing usable space—attractively, promptly, economically and with sound logical construction. And the office building deserves not alone a high quality of architectural design, but skillful *economic planning*, which means such treatment of the site and the structural elements as will produce an arrangement of space and equipment capable of earning income in excess of expense. It is with such economic planning that these notes are chiefly concerned, not through the presentation of the detail of the design of a single building but through the review of certain fundamental principles underlying the correct study of such buildings as a type.

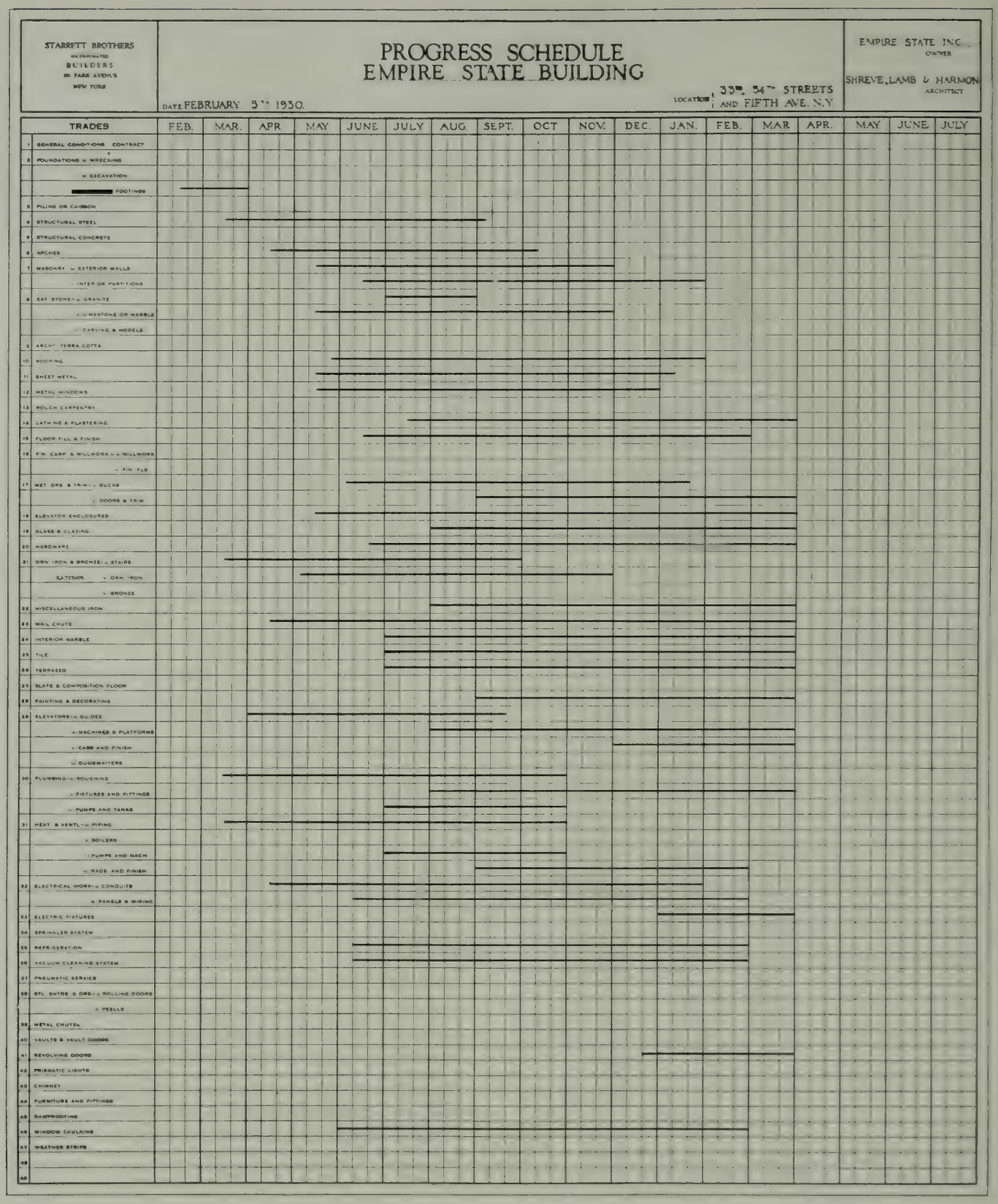
To set up properly an income-producing building the control of its design and construction should be in the hands of a Board on which sit Owner, Banker, Builder, Architect, Engineers, and Real Estate Men. The record of their decisions finds place in plans, specifications and contracts, financial transactions and leases, and the outcome of their work, if it is to be successful, must have been foreseen far in advance of its realization.

The program starts with the selection of a site; many may be considered, but for each there must be made an analysis of cost of land and building, method of financing, total and net investment and total and net income. For the production of income (or its equivalent) is the primary purpose of building, and whether the structure is to be the home of a great business, such as a public service corporation or a life insurance company, or the abode of numerous tenants constituting a mixed occupancy, it is necessary, if it is to be income-producing and not income-consuming, that it should meet the test of the economic and legislative factors which affect every business building project.

One of these factors, and a most important one, is the *time element*, the answer to the questions "When?" and "Within what time?"

In order that invested capital may be kept to the lowest possible figure and income produced at the earliest possible date, the work must be done in the least possible time consistent with comparative economy.

It is because of this principle that New York has witnessed the erection *in one year* of the Bank of Manhattan Building at 40 Wall Street, requiring the demolition of existing stone and steel buildings covering a site over 40,000 feet in area, and the creation of a sixty-odd story structure, now the tallest in the world, all of the work including demolition and foundations being done in the twelve months between May 1, 1929 and May 1, 1930.



PROGRESS SCHEDULE SHOWING PROGRAM OF CONSTRUCTION

EMPIRE STATE BUILDING, NEW YORK CITY

SHREVE, LAMB AND HARMON, ARCHITECTS

A chart of this nature shows how carefully the many processes that go into the building of a modern office structure are timed and controlled. "The plaster may appear in the lower floors before the roof, many stories above, has been made tight."

Item (4) fixes the time within which the steel is to be erected. This item by itself is shown on page 346 carried into greater detail.



PROGRESS PHOTOGRAPH

EMPIRE STATE BUILDING, NEW YORK CITY

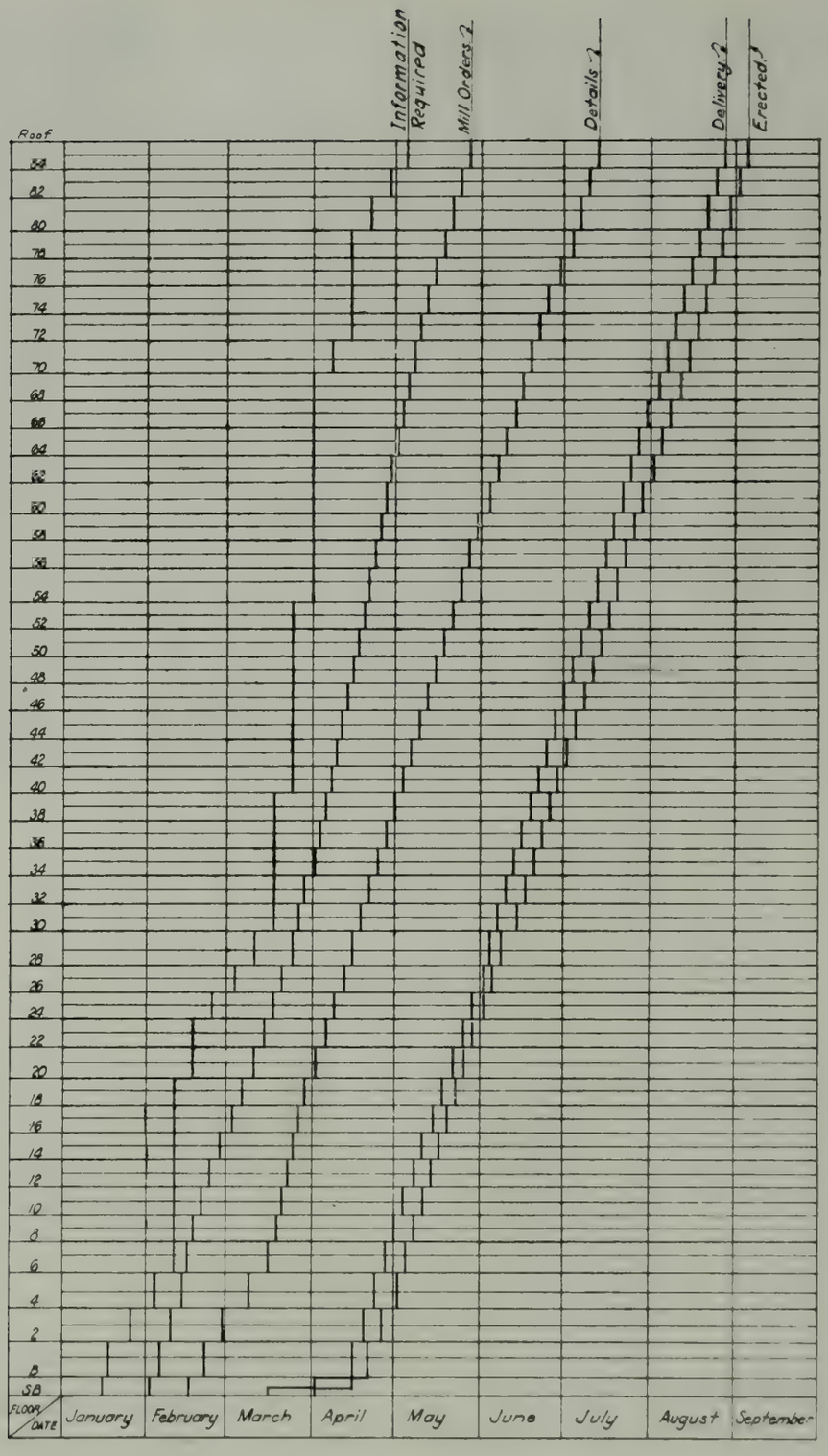
SHREVE, LAMB AND HARMON, ARCHITECTS

Showing three processes going on side by side: (1) Demolition of the existing structure, at the left; (2) moving out the rock, at the right; and (3) placing footings, in the center.
(See text directly below)

It is for this reason, too, that a greater construction program is being developed in the case of the Empire State Building, requiring feats of organization in some respects never before attempted. Excavation in rock far below the street goes on for twenty-four hours a day; foundations are placed at one side of the property as the steamshovels and drills carry on on the other; steel columns, some weighing a ton to the linear foot, and girders and beams finished to a sixteenth of an inch, are in various stages of progress at mill and shop or stored ready for delivery in the New Jersey yard, with some truck loads crossing the river, others toiling to reach the site through New York's one-way traffic system, while still others stand at the building unloading, and high above the street great bundles of metal at the ends of cobweb cables swing onto the working platform where steel members lie in orderly arrangement to be set in place by the erecting gang. The prompt delivery and precise erection of 50,000 tons of steel in five months is an essential of the completion of the program. Just below the top-most steel, as it is set, are the riveters securing the lower members in place; alongside and through the frame rise the stairs taking the place of ladders, and at many points are visible the main lines of the pipe trades, the veins and arteries attaching to the steel skeleton. Floor arches, exterior walls and windows, elevator hatchways, finished floors, marble halls, and all the finishing trades follow in such a rapidly moving but orderly parade that the plaster may appear in the lower floors before the roof many stories above has been made tight.

The demands of such a program necessitate the employment of every practical means for shortening the elapsed time required for all construction operations in an effort first to reduce that part of the cost which is known as *carrying charges* during construction, including interest on investment, taxes, etc., and second to avoid loss of rent through completion later than May first, which is the date as of which most business-space leases begin, just as dwelling-space leases date from the first of October.

For this reason the time for beginning building operations should be so calculated that the structure, completed in the shortest possible period consistent with relative economy, shall be ready for occupancy before the first of May, for otherwise the loss of in-



DETAILED PROGRAM FOR MANUFACTURE AND ERECTION OF STRUCTURAL STEEL

EMPIRE STATE BUILDING, NEW YORK CITY

SHREVE, LAMB AND HARMON, ARCHITECTS

Fixing dates for (1) furnishing complete information by drawings, (2) placing mill orders, (3) completing fabrication details, (4) delivering, and (5) erecting, for the steel of each tier.

come for the period through which the rentable space is unoccupied must be added to the loss due to fixed charges on capital invested and the outlay necessary to operate and maintain the building.

This time-element enters into our economic study as a variable factor measurably under control; a second influence, *land cost*, is less flexible and, indeed, at present in New York appears as a most compelling influence.

The Waldorf-Astoria Hotel site, upon which the Empire State Building is to be placed, is reported to have cost $16,000,000: something over $8,000,000 an acre. The plot at the corner of Fifth Avenue and 43rd Street was a few years ago sold at a price approximately $340 a square foot, or $15,000,000 an acre. Land at No. 1 Wall Street facing Broadway, now being built upon, is reported to have cost the present owners between $700 and $800 for each square foot, at which rate an acre would reach a price of $35,000,000 or $40,000,000.

There is a difference of opinion as to whether this high land cost is the reason for the intensive building development, or whether permitting the intensive development is what causes the high land cost, but the fact is that with these and even lower land prices, which prevail in most of those sections of New York in which office buildings are built, the structures erected are designed to be of such a nature, extent and arrangement as to justify and support by income-production the high cost of the site. It is therefore a prime requisite that the design shall distribute the cost of the land over the largest practical area of usable floor surface set up in accordance with building cost, building laws and profitable use; all influences which must be given our consideration.

Building cost is both a result of the study of the design of the building and a factor influencing that design through determination of the methods of construction, selection of materials, and arrangement of structural elements which make up the occasion of the total expenditure for the building itself, and which, later, will enter into the analysis of the design from the economic view-point.

But municipal and state laws and the Economic Law have a greater effect than building cost or structural problems in governing the production of floor space, or the height and bulk of business buildings, in the City of New York, so we shall need to see how these two forces, municipal and Economic Law, operate.

Zoning. The Building Zone Resolution of the City of New York divides the entire city into Areas or Zones classified under three heads and dealing with:

1. The *use* of the property and buildings;
2. The *area* of the site built over;
3. The *height* to which the building may be carried.

The *use* we are considering is that of the office building; the *area* permitted to be built over will be considered as unlimited (save as courts are required to permit legal sub-division of larger spaces); we may then give our attention entirely to the law controlling the *height*.

Upon the street lines or building lines of a given property the exterior walls may be carried only to the height fixed by law. This limit is related to the width of the street in front of the site, the permitted height in different districts being from ¼ to 2½ times the street width. Thus in a 2-times district and on a site facing a street 100 feet wide, the wall on the building line may not be carried more than 200 feet above grade, while on a 60-foot street a height of only 120 feet would be allowed. These limits may be extended through excess-height allowances, permitted where neighboring buildings exceed the standard lawful height.

Above this street-wall height-limit the bulk of the building must be kept within sloping lines setting back from the street front one foot horizontally for each unit of height—this set-back height unit factor being twice the factor used in fixing the street wall height; thus, in a "2-times" district the slope is one in four, in a "2½-times" district one in five.

Different rates of set-backs govern the walls on yards or courts; dormers, so-called, are permitted under certain conditions; special rules govern in special circumstances quite too complicated to permit discussion at this time; but finally, the tapering structure having been reduced by a series of set-backs to a building area equal to one-quarter of the site area, the tower condition is arrived at. Above this level the building, that is the tower, may lawfully extend to any height, but the study of the mass to determine this height is governed more by the Economic Law and structural problem than by man-made codes.

This maximum permitted envelope, a geometrical form consisting of a base enclosed by vertical walls, an intermediate section defined by sloping limits, and a tower, must be analyzed to determine how most profitably to place within it practical usable office floor area, supported and enclosed by structural forms, served by mechanical equipment, and reached through public spaces which are not directly sources of revenue. This problem which includes fixing the height of the tower is solved by study of the floor plans of the building, by the application of the Economic Law to the form evolved under the Zoning Ordinance. The important floors requiring attention are the ground or first floor, the *typical office floor*—that is, one of the large number of floors occupying the base of the building,—the *set-back floors*, and the *tower floor*.



LEFCOURT NATIONAL BUILDING, NEW YORK CITY

SHREVE AND LAMB, ARCHITECTS

(*See plans on opposite page*)

The most important of these is the *typical floor*, first because from it generally is derived a great part of the rental income, but more especially because its plan governs the plan of the *ground floor* below and the *tower floor* above. There are buildings in which the ground floor plan has been permitted to control the balance of the building. The result is not often fortunate and is frequently disastrous, but in some cases such as use of the ground floor by a bank, may be justified. In order that we shall not complicate our analysis, we may make an assumption quite common in the study of an office building in its preliminary form, that the floors below the third are likely to be of special nature, involving special planning and producing income at special rates; and so we may proceed to the study of the body of the building, beginning with the arrangement of the typical floor.



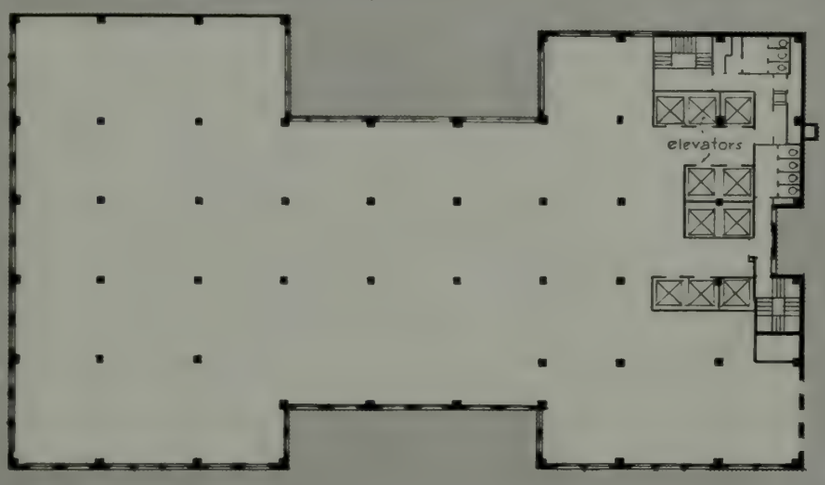
·PLAN · OF · TOWER·

THREE KEY PLANS

LEFCOURT NATIONAL BUILDING, NEW YORK CITY

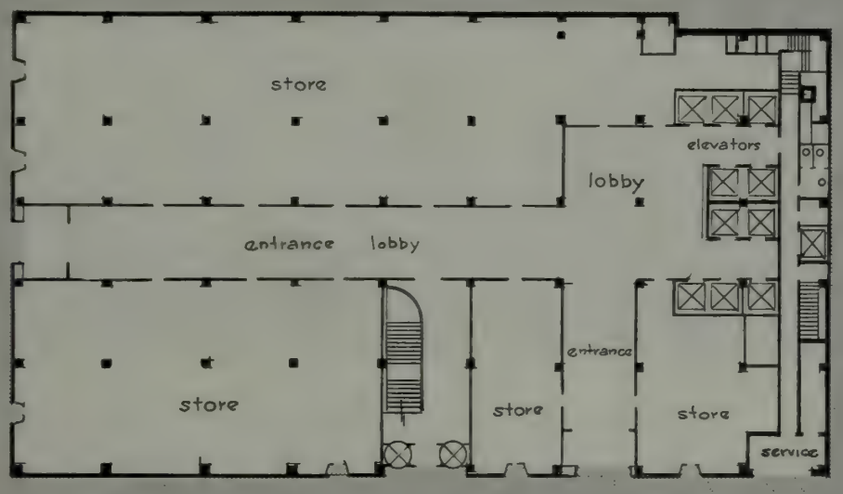
SHREVE AND LAMB, ARCHITECTS

(This building is shown as Number (2) in the comparative table on page 358)



TYPICAL FLOOR PLAN

THIS TYPICAL FLOOR PLAN is of great importance. The study of this floor determines the location of the utility group which is projected down to the first floor (shown below) and up to the tower plan (shown above)



FIRST FLOOR PLAN

THIS IS THE GROUND PLAN In this particular building, the utilities have been so placed that this floor can be either used as one unit (e.g., for a large store) or subdivided. Note also that the elevators running through to the tower (shown at the top) do not interfere with the local elevators



Rendering by Chester B. Price

GENERAL MOTORS BUILDING, NEW YORK CITY

SHREVE AND LAMB, ARCHITECTS

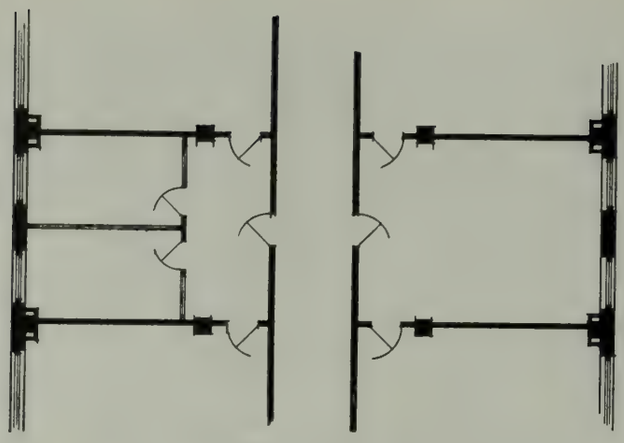
(See plan on page 352)



CHIMES BUILDING, SYRACUSE, N. Y.

SHREVE AND LAMB, ARCHITECTS

(See plan on page 353)



THE CORRIDOR AND OFFICE UNIT

THE PRIMARY ELEMENT OF THE WHOLE STRUCTURE

The designer should keep this basic unit firmly in mind since the office building is essentially a multiplication of such units.

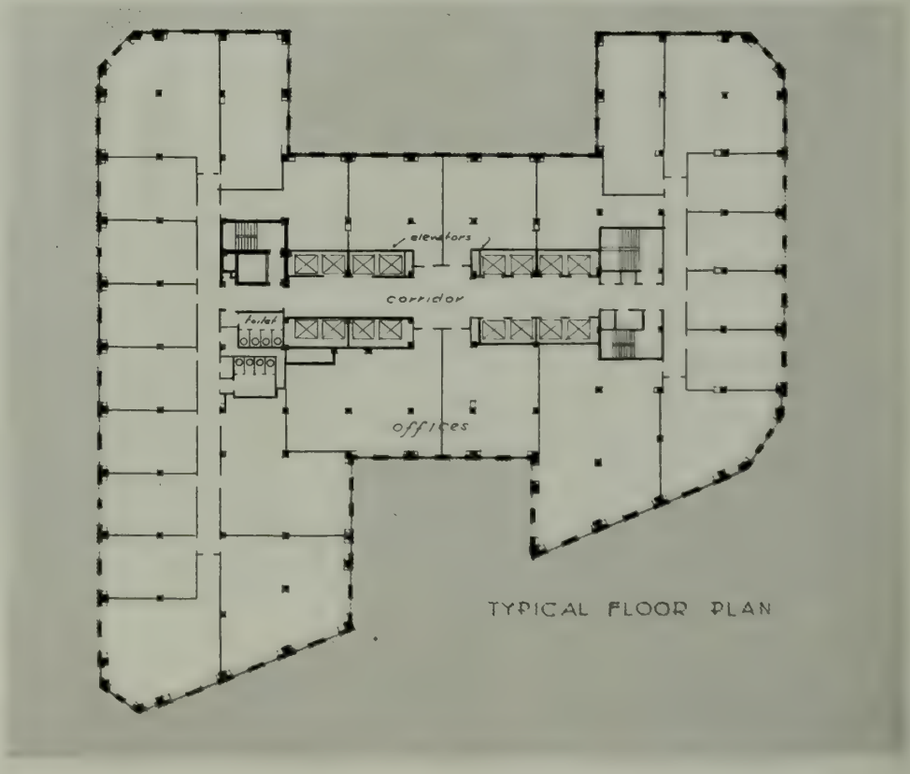
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Office space as distinguished from loft space is built upon a basic office unit, the cell which multiplied around the central group of building "utilities" may be said to make up the floor plans and so produce the total structure.

In New York this office unit is approximately twenty feet wide, measured between columns along the line of the exterior wall, and is from twenty-five to thirty feet deep from the plaster line. Two windows, each perhaps 4′6″ or 5′0″ wide, provide natural (or legal) light and air. It is possible and practical to form within this larger unit two small offices, each nine to ten feet wide, each having a window and each providing room for one tenant. Two such small offices may have for common use an anteroom or work space opening to the office corridor of the building.

If this office unit is duplicated across the corridor, we shall have established a standard arrangement for a section of an office building containing a corridor six or seven feet wide, with a series of offices on each side about twenty-eight feet deep,—a total width including walls and partitions of say sixty-six feet over all. This type is illustrated by the plan of the Graybar Building.

On the other hand, if such standard office units be placed about an arrangement of elevators, stairs, toilets, and a general group of smaller utilities, such as vents, shafts, slop sinks and meter closets, we shall increase largely the width of the building between outside walls, as in the General Motors Building. But in any case, when we speak of the design of office buildings we must have in mind primarily the arrangement of the *basic unit spaces* with their structural members, their service utilities, and their inter-communication or circulation. In this way we can produce on each floor, and so in the entire building, the greatest practical amount of usable office floor space.



GENERAL MOTORS BUILDING, NEW YORK CITY

SHREVE AND LAMB, ARCHITECTS

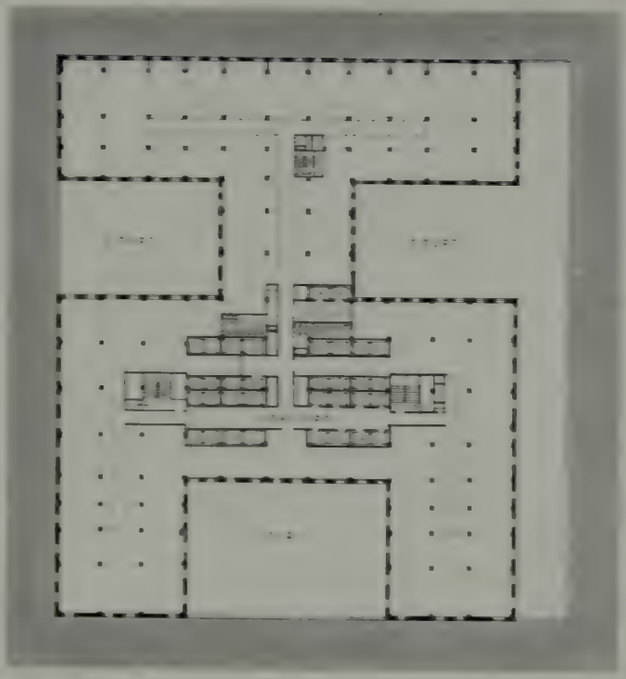
Here is the office unit (shown above) arranged about the central utilities in such a way that nowhere does it exceed its normal depth. Those corner offices of which the actual measurements are greater have compensating window exposures. This building is Number (1) *in the Table on page 358*

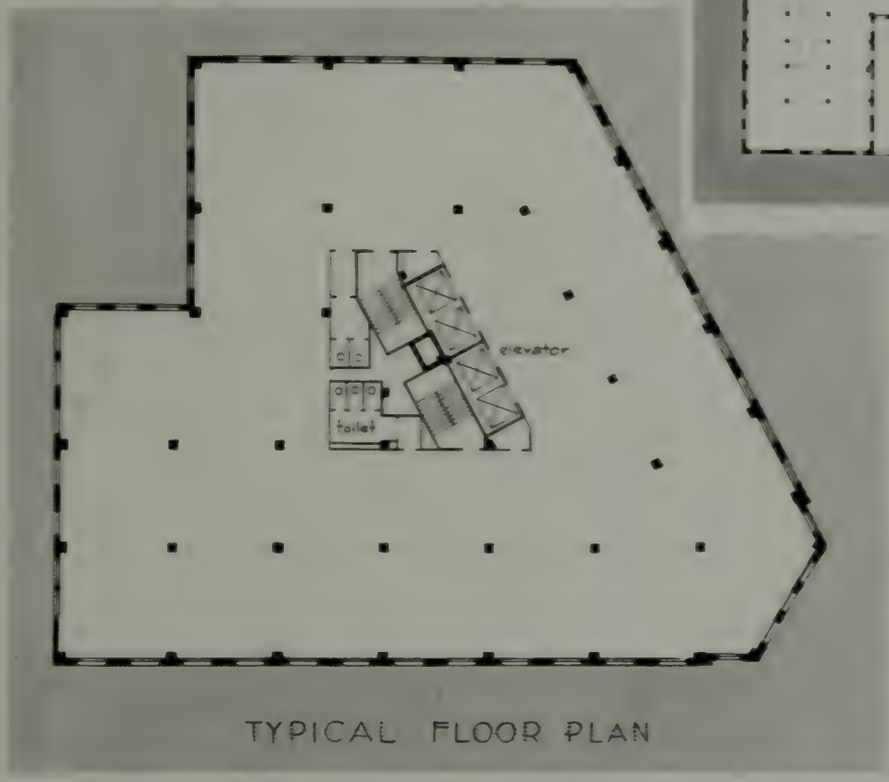
GRAYBAR BUILDING, NEW YORK CITY

SLOAN AND ROBERSTON, ARCHITECTS

The literal multiplication of a unit cell (like that shown on the opposite page) as the office building rambles about seeking space. This is a very efficient and well-lit plan

This plan is referred to in the text on page 352





TYPICAL FLOOR PLAN

CHIMES BUILDING, SYRACUSE, NEW YORK

SHREVE AND LAMB, ARCHITECTS

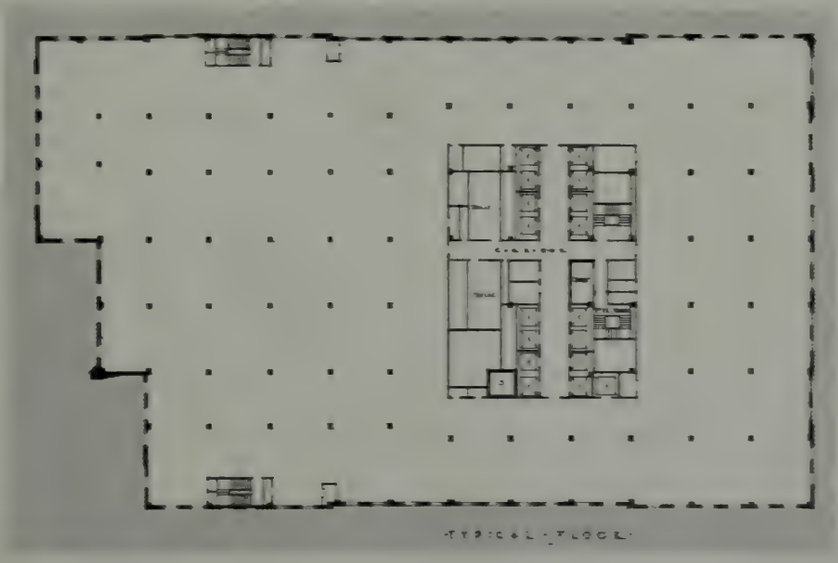
Another example (across the page is the first) of 28′ office units about a central group of utilities. The deeper offices at the angles have compensating light from two sides instead of one. A compact plan

This building is Number (5) in the Table on page 358

WESTERN UNION BUILDING, NEW YORK CITY

VORHEES, GMELIN AND WALKER, ARCHITECTS

The exception to prove the rule. This building is arranged with respect to the tenant's special needs instead of following the 28′ office-unit practice



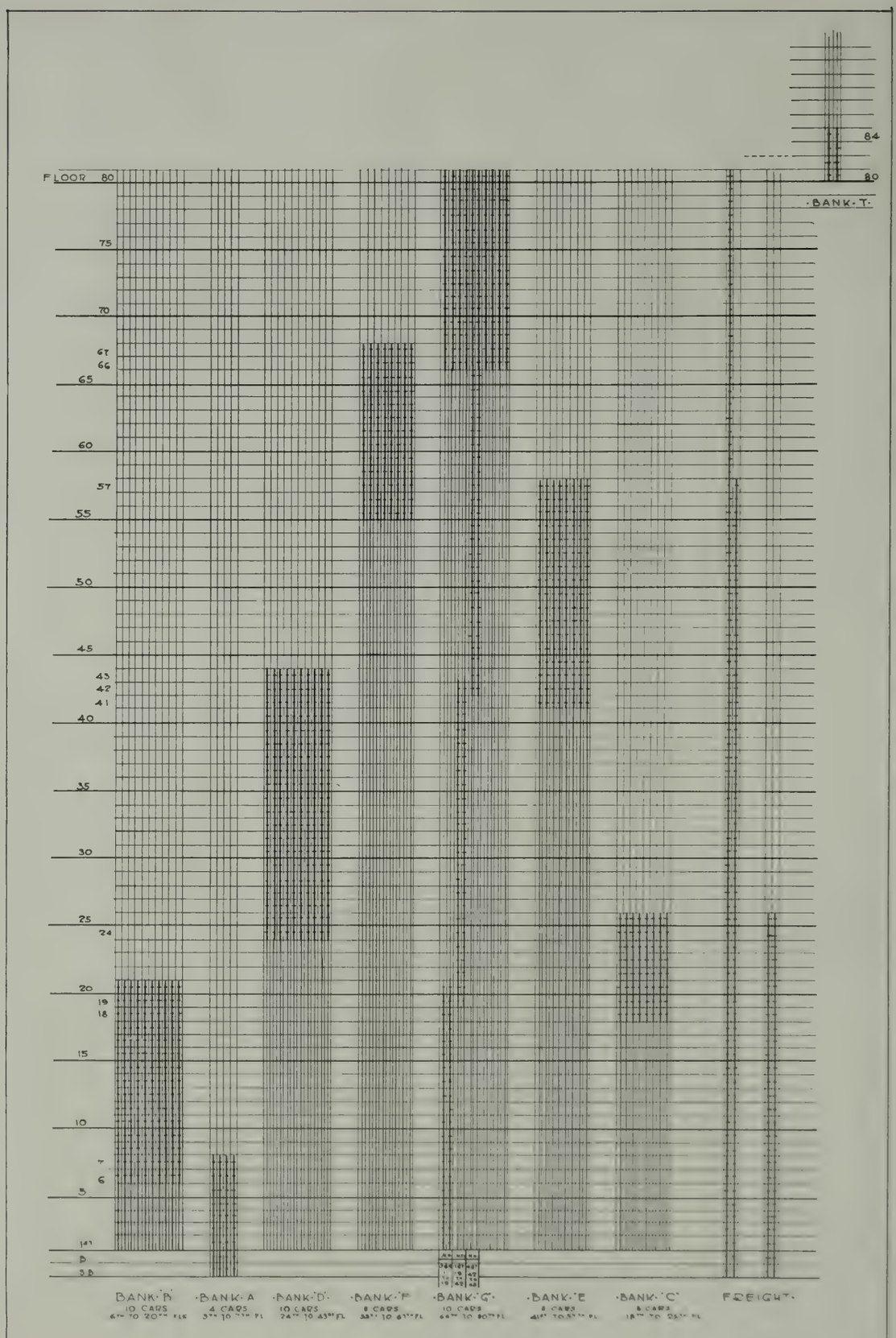


DIAGRAM OF ELEVATOR SERVICE

EMPIRE STATE BUILDING
SHREVE, LAMB & HARMON
ARCHITECTS

To serve this space, to permit its legal and comfortable use, and to make it the source of income, the other essential elements of an office building must be provided.

Elevators take first place in this group. They, more than any other feature of common use by tenants, fix the standard of the building. The determination of the right elevator installation is therefore of the utmost importance. When a building under the so-called "old law" had a uniform floor area and floor arrangement throughout its modest height, it was common practice to approximate the number of cars by providing one car for each 25,000 square feet of floor area. Today, with buildings carried to greater heights or made up of floors of varying arrangement and area and with the sharper demand for better and more rapid elevator service, more accurate calculation of the elevator installation is necessary.

In considering the elevators we must, therefore, first determine the type of building—in the present case an office building;—then the type of tenancy, which may be single-use occupancy as that of the New York Telephone Company's building, or a mixed occupancy as in the standard commercial structure. It is necessary then to establish the probable number of occupants and the proportion of these people who come and leave at one time, as at nine in the morning, or five in the afternoon, or at the lunch hour, these constituting the periods of peak load. It is usual practice to assume as peak load that one eighth or one ninth of the entire building population must be taken care of in five minutes. Further steps in the calculation become more technical but involve the number of floors served as affecting the number of stops, the areas of these floors and their occupancy, and the interval at which cars leave the entrance floor, 20 seconds for excellent service, certainly not over 30 seconds for good service, and not over 40 seconds for fair service. With these conditions known or assumed, we must consider the length of hatchway travel, the speed of the cars, their capacity expressed in number of passengers, the size of cars and number in each bank, the method of controlling the starting and stopping, the control of opening and shutting car gates and hatchway doors; we must allow for a certain number of bad stops or count on mechanical leveling of cars, and must take into account the type of signals; and, allowing for all these and even other factors, we set up our elevator layout. The importance of doing this correctly may be judged from the fact that the existence of an insurance company in a building not designed for such a tenancy has upset the service of an elevator installation otherwise quite adequate to meet normal demands; and the introduction of a stock brokerage house and the use of the elevators by numerous runners incident to its business has destroyed all possibility of satisfactory elevator service.

The position in the building of the elevator hatchways extending vertically through all floors imposes on each other floor from top to bottom of the building a condition practically fixing circulation and plan arrangement. The elevator problem is therefore of importance in any high building, but becomes a vital matter where there are installations of 30, 40, and even 50 elevators, of which there are not a few in New York.

In the design of the Empire State Building every effort was made to concentrate elevator equipment and eliminate unnecessary hatchways; careful study was given to the possibility of operating two cars in one shaft, thus combining the low and high rise banks, and saving floor space and extra construction cost; plans were made also for a transfer floor near the fiftieth story to which high speed express elevators automatically controlled would run from the ground floor. At some near future date such projects will be carried out but for this building no scheme of elevator installation now available was considered more likely to be satisfactory to tenants and landlord than that shown on the diagram presented with these notes.

To meet the requirements of the Building Code of the City of New York adequate *exit facilities* for all buildings must be provided. While there are several types of exits, the most common in office buildings is the fireproof enclosed stairway. For each floor there must be one, and an additional one when the floor area is in excess of 2,500 square feet. For still larger floor areas there must be added stair capacity proportional to the floor's population. This occupancy is to be taken as one person to every 50 square feet of floor surface in office buildings, or such other number of persons as may have been stated in the application for permit to construct the building and approved by the Superintendent of the Bureau of Buildings.

In office buildings exceeding certain stated heights, at least one stairway shall be a fire-tower; that is, the stair shall be enclosed in brick or reinforced concrete and be reached only by an entrance opening to a street front, or the wall of the yard or court, which must be not less than 100 square feet in area.

The capacity of a stairway is required to be calculated on the basis of one person for each full 22″ of width and 1½ treads of the stairway, and one person for each 3½ square feet of floor area on the landings and halls within the stairway.

It is the intention of these provisions that the stairways leading down from a floor shall have capacity, measured on the basis just stated, to accommodate the total number of persons permitted to occupy the area which the stairs serve—without the necessity of these persons intruding on stairways below or above.

No point on a floor shall be over 100 feet from a stair, nor, if the floor be divided into offices, shall



THE REYNOLDS TOBACCO COMPANY BUILDING, WINSTON-SALEM, N. C.
SHREVE AND LAMB, ARCHITECTS

REYNOLDS TOBACCO COMPANY BUILDING, WINSTON-SALEM, N. C.

SHREVE AND LAMB, ARCHITECTS

Again the 28′ deep office is the basic unit, with the utilities occupying the 'blind space.' The set-backs are on the street, and because of the climate there is a wider court than is usual among more northerly cities.

This is Number (**4**) *in the Table on page 358*



PLAN OF TYPICAL FLOOR 3RD TO 6TH FL. INC.

the door of an office be more than 125 feet distant, along an unobstructed hallway, from a stairway.

All of these stairs must have proper exit connections to street or other approved spaces, and at least one stair must be carried to the roof.

It is in accordance with requirements as detailed as these, and covering also the handrails, treads and risers, landings and openings, that the stairs are fitted into the structure under the provisions of the present Building Code of the City of New York. In the course of the work on the proposed revision of this Code much study has been given to the adequacy of such provisions, especially in relation to very tall buildings. In case of fire or other emergency occasion for use of exit facilities, would the stairs be practically useful? How few persons, even those in normal health and unaffected by emergency exit conditions, could make their way down a thousand steps or more in safety, and how much more difficult would the problem be were there many among them overcome by intolerable conditions or aroused by unusual stress? What assurance can we have as to the movement of smoke under the influence of the chimney effect of a high structure?

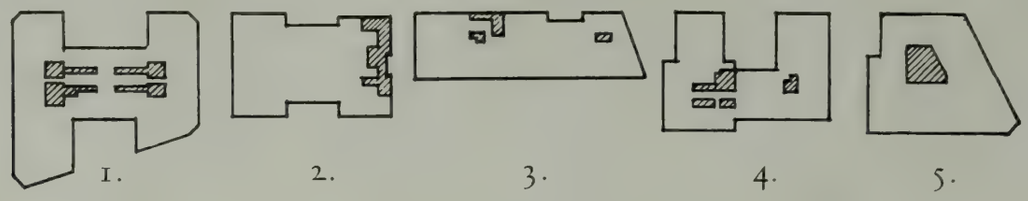
It is possible that refuge areas, especially protected from fire and cut off from the rest of the building may, with the aid of the modern elevator and its closed hatchway, prove to be the safer and more effective first means of exit. Should this or some other variation of the present plan develop, our use and arrangement of floor space would be subject to such revisions.

Where floors are not occupied by a single tenant but are subdivided, passages affording circulation must give tenants access to each stairway, to the elevators and to the toilet rooms; the building service staff must be able to reach the slop sink closet or porter's work room, and the metering closet for electric service control. These passages or corridors, where essential to public or service circulation, should not be considered a part of income-producing space. It is true that where a floor is leased to one tenant, corridors may not always be partitioned off, and the space may be directly useful and under semi-private control; but in principle the ultimate income should not thereby be modified, nor the study of the economic set-up changed.

On each floor provision must be made for the passage of vent ducts or the smoke stack, if there is to be one, for the shafts in which plumbing and other pipes or conduits are carried up through the building, for basin lines at columns and for sprinklers if these are to be used (though this is not customary in office buildings), for electric feeders and telephone and messenger call connections, sometimes for watchman's connections or for fire alarm service lines and stations, and for a mail chute so placed as to meet the requirements of the Federal Government.

(*Continued on next page*)

COMPARATIVE DATA



1. 2. 3. 4. 5.

	1. GENERAL MOTORS BUILDING	2. LEFCOURT NATIONAL BUILDING	3. STANDARD BUILDING	4. REYNOLDS BUILDING	5. ONONDAGA BUILDING
FLOOR TO FLOOR HEIGHT	11′-3″	11′-3″	11′-3″	12′-6″	11′-3″
LOT AREA	32,370	19,047	15,494	26,633	13,681
TYPICAL FLOOR BUILDING AREA	27,100	16,740	14,950	18,723	12,601
TYPICAL FLOOR BUILDING AREA INSIDE WALLS	26,035	16,095	14,341	18,000	12,160
USABLE AREA PER TYPICAL FLOOR	23,695	14,851	12,987	16,225	11,040
Percentage of TYPICAL FLOOR BUILDING AREA TO LOT AREA	84%	88%	97.5%	70%	92%
Percentage of USABLE AREA TO LOT AREA	73%	78%	83½%	61%	81%
Percentage of USABLE AREA to BUILDING AREA INSIDE WALLS	91%	92%	90.75%	90%	90.5%
CUBE OF BUILDING	7,444,971	5,668,957	2,567,856	3,939,841	2,150,000
CUBIC FEET REQUIRED to Produce One Square Foot of USABLE AREA	14¼	15½	15	17½	14½

The several typical office-building floor plans reproduced on these pages serve to show arrangements of open or divided office spaces extending from the perimeter or outer wall into the corridor leading to or built around the elevators, stairs, toilets and other utilities.

Examples varying in plan system have been selected. The General Motors Building, New York, (1), facing four streets, has an internal utility group placed midway between the outer walls and filling the dark corners of the plan. The second office building (2) is a corner property fronting two streets, with all the mechanical and service elements bunched in the inner angle of the plot. One of the most efficient plans is that of the Standard Building, Albany, (3), lighted from three streets, with the utilities grouped on the inner property line, on which also a small court is placed to light the part of the floor space lying near the second stairway. Two of the three facades of the Reynolds Tobacco Company's Building (4) have been set back from the street line to secure better light and air conditions, and a large court has been placed on the inner property line. Utility units are in the darker inner corners of the plan. The fifth plan (5), that of the Chimes Building, Syracuse, shows an inner core of compactly placed service and mechanical elements, securing a maximum amount of floor space well lighted by the two streets and the court in the inner property corner.

All story-heights of these illustrative plans are alike (11′3″ floor to floor) except that the Reynolds building has a greater height (12′6″) affording better light and air conditions, but somewhat increasing the cubical content without increasing the floor area.

The analysis of the several typical floors is noted in the table comparing site areas, building areas, usable space and cubical contents; and the ratios existing between these comparable data.

In the study of the building and the selection of

the best of several floor arrangements, the plan arrived at for the typical floor fixes the fundamental conditions of the *ground floor* and the *tower floor* plans. The next major question is to determine the number of tower floors, the answer to the question,

"How high shall the building be carried?"

Up to a certain height added floors give the advantage of the distribution of the land cost over the added floor space. But as height increases this gain is offset more and more by the need of heavier steel columns and foundations, additional elevators, increasingly disproportionate demands for space for utilities, extreme windbracing, and all-round increased construction cost at the higher levels. Extra stories must be thought of as being added at the bottom of the steel frame instead of at the top, just as if the lower building were lifted and the extra stories put under it, or, otherwise, the load of the added upper space must be provided for by strengthening the steel carried down through the building. Extra elevators are required to serve the added stories, but these cars must run up through the height of the building before they reach the zone which they are intended to serve, and in each story through which an idle hatchway passes 60 to 80 square feet of floor area are given up to the passing car.

In the higher buildings, at present elevator speeds, a car may be ¾ of a minute or a minute or more in travel before making a stop. This may mean 3 or 4 minutes to a car round trip; and in order to maintain the elevator service interval at the ground floor after the first car leaves and before it returns, many more cars must be added to serve these upper floors than would be required to serve an equivalent space at a lower level.

Today in New York ten buildings have a height of 50 stories or more. Higher buildings are being considered. Water supply, house and fire pumps, steam supply, ventilation, all must be especially arranged for service through such a height. Heavy wind pressures on such buildings would produce an actual sway of flexible towers not sufficiently windbraced, and full windbracing adds to steel cost.

Taking into account all of these and other conditions, it is evident that in the case of such buildings there is a point where the balance begins to swing back and the rate of return on capital investment begins to diminish as the building goes higher, unless the owner gets a markedly greater unit return for the higher space, or charges the decrease in the direct net return to "advertising".

Our preliminary study of the economic features of the project closes with fixing the number of stories to be created and the plans of the several floors. A statement may then be set up in the following manner:

OFFICE BUILDING

FINANCIAL SET-UP

Cubical Contents (approx.)	10,188,000 cu. ft.	
Net Rentable Area	738,890 sq. ft.	
Cost:		
Land	$7,000,000	
Estimate cost of bldg. @ 60c cu. ft.	6,112,800	
Architects, Engineers, Builder's fees, Brokerage, Financial, Carrying charges during construction	940,000	$14,052,800
Gross (estimated) mortgages		11,200,000
Estimated Equity or Cash Investment:		$ 2,852,800
Estimated Income:—Annual		
Ground and Second floors, Basement and Sub-bas't Approx. 160,000 sq. ft.	$ 780,000	
Third floor and up	1,740,000	$ 2,520,000
Estimated Expense:—Annual		
Interest on Mortgages	$ 620,000	
Operation (estimated)	420,000	
Average leasing commission	20,000	
Insurance	15,000	
Taxes	275,000	$ 1,350,000
		$ 1,170,000
Deduct amortization of mortgages beginning 2 years after date of mortgage		360,000
		$ 810,000
Allow for vacancies		250,000
Estimated Net Return After Amortization and Vacancies:		$ 560,000

Equal to 19.5%
on
CAPITAL INVESTMENT OF $2,852,800.

From such an analysis we may determine if the business outlook is good, and, with the economic problem solved, approach the refinement of the architectural design which has been kept in mind through the survey of the determining factors. The demands of time, cost and practicability need not be hostile to the aesthetic side of the work. Indeed, may it not be fairly said that character is improved and greater success of pure design assured if sound reasoning as to value, and honest recognition of function, accompany and guide our struggle to attain architectural beauty?



Photo. Steiner

NURSERY BUILDING

THE OAK LANE COUNTRY DAY SCHOOL, PHILADELPHIA*

HOWE AND LESCAZE, ARCHITECTS

The school is for children from two to four years of age. The entire scale of the building is, therefore, reduced wherever possible to fit the size of the children. The doors to the classroom are very low and the treads and risers of the various stairs are in proportion. This is in order that the children may feel an intimacy with their surroundings instead of the usual adjustment to an adult world constructed for those of adult size.

•

PLAN

The building in its completed form will consist of two class-rooms connected by a hall, from which open the wash-room and kitchenette, as well as the teachers' private office. Only one of these classrooms has been built, but the adjacent wall of the second classroom is completed so as to close in the end of the porch which is built against the south side of the school building. The porch consists of two levels: the lower constituting an outdoor playground for bad weather, and the upper forming a deck roof reached by a stair from the lower level and used as sun room and playground for clear warm days in spring, when the grounds are still not in a suitable condition for use. This sun room is protected on two sides by the building itself, and is enclosed on the other two sides by a high, solid parapet so that there may be no chance of any child falling over or through a railing. The shelter over the staircase forms a protected corner in the angle facing southeast.

* This building was the gift of Mr. and Mrs. Leopold Stokowski.



Photo. Steiner

DETAIL OF CORNER WINDOW, NURSERY BUILDING

OAK LANE COUNTRY DAY SCHOOL, PHILADELPHIA

HOWE AND LESCAZE, ARCHITECTS

The walls are constructed of concrete blocks covered with stucco. This stucco is white on the walls facing southwest and north, and is painted blue on the walls facing east.

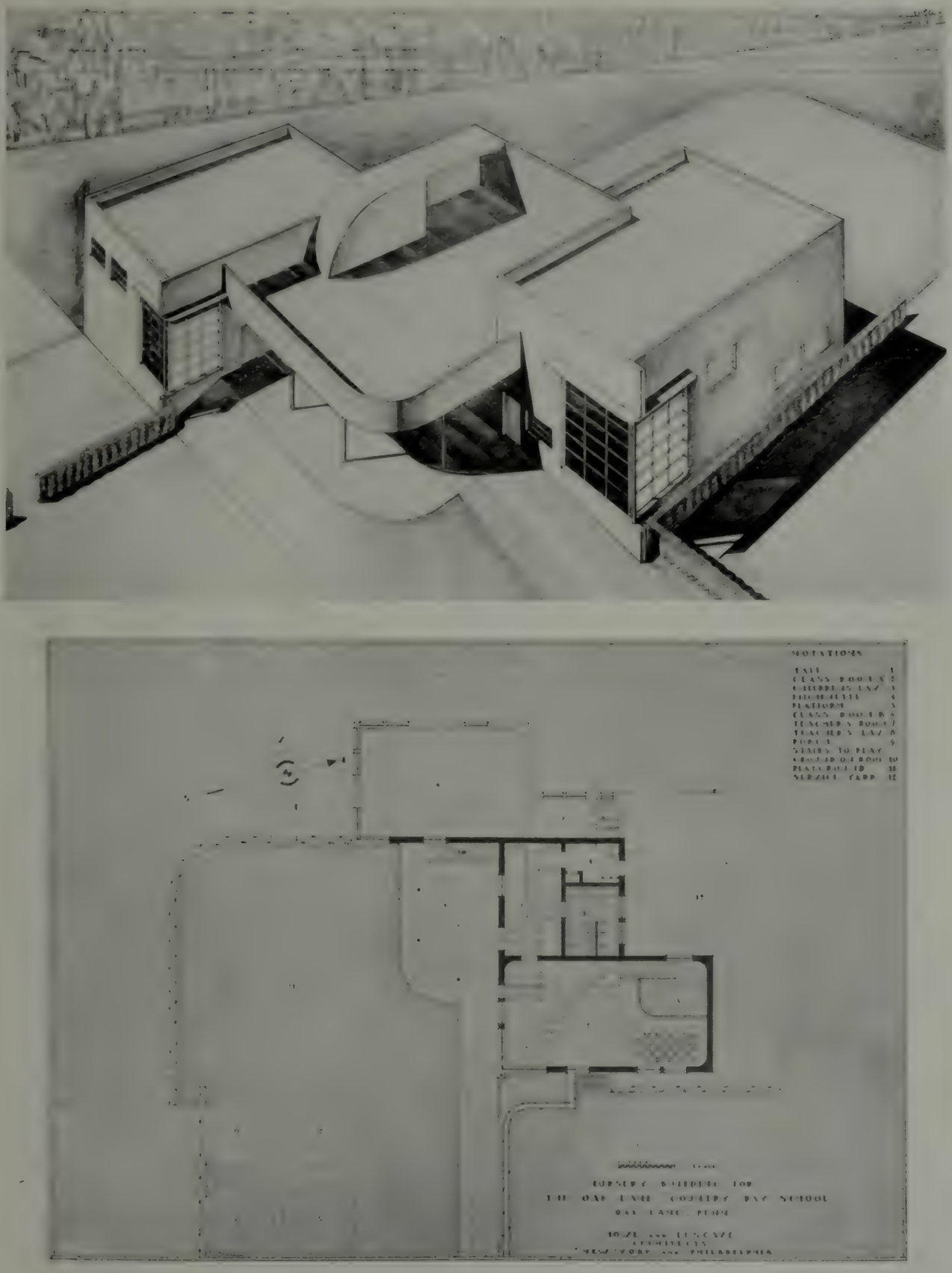


Photo Verner

INTERIOR OF MAIN CLASSROOM, NURSERY BUILDING

OAK LANE COUNTRY DAY SCHOOL, PHILADELPHIA

HOWE AND LESCAZE, ARCHITECTS



PERSPECTIVE AND PLAN, NURSERY BUILDING

OAK LANE COUNTRY DAY SCHOOL, PHILADELPHIA

HOWE AND LESCAZE, ARCHITECTS

In the interior the hall and classroom are floored with cork in special patterns, as shown above. In the corner of the classroom is a raised platform provided with a staircase of miniature scale which serves either as a secluded corner somewhat separated from the general space of the room, or as an elevated point of vantage in various games.



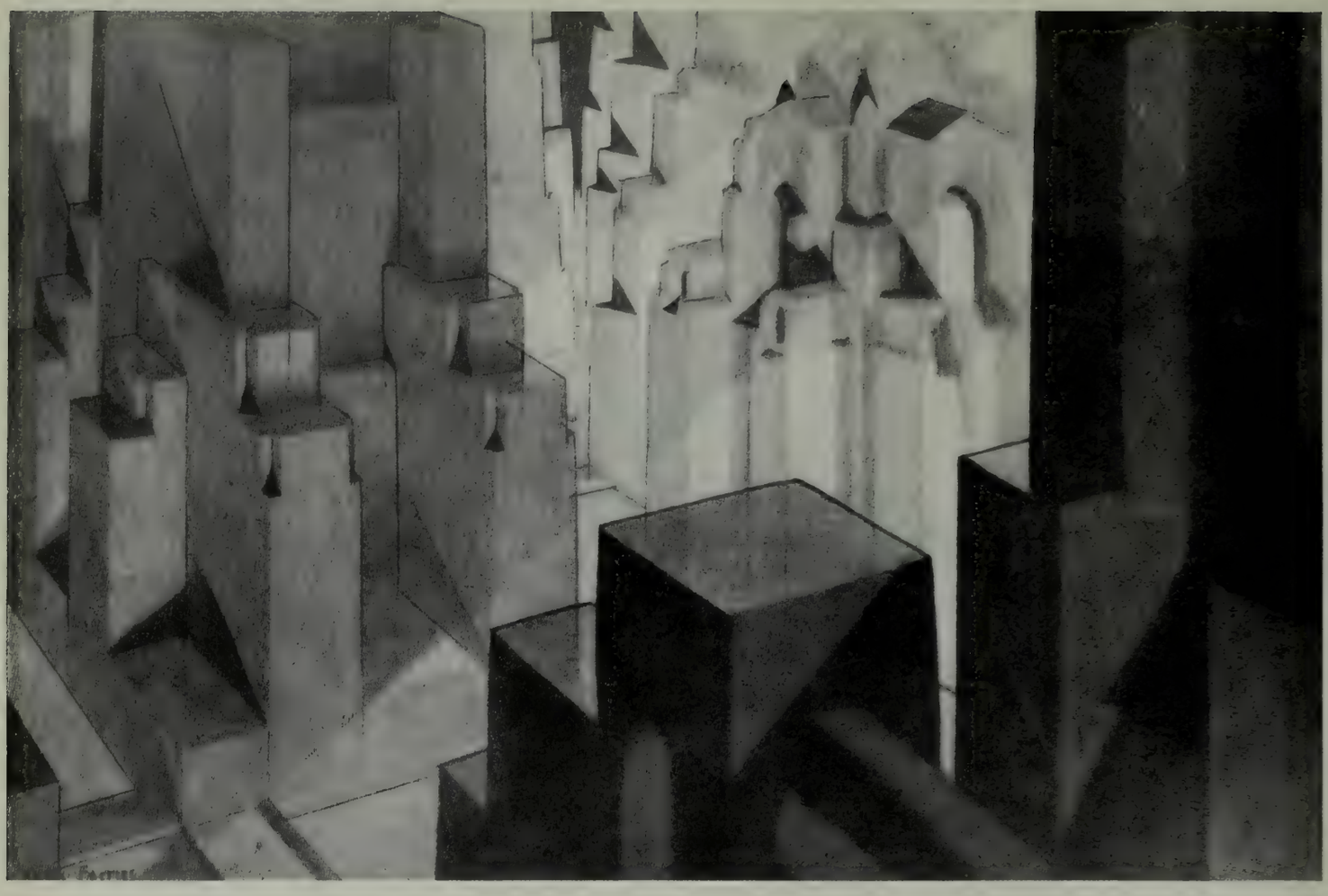
HOUSE OF MR. RODMAN E. GRISCOM, PHILADELPHIA

EDMUND B. GILCHRIST, ARCHITECT



HOUSE OF MR. RODMAN E. GRISCOM, PHILADELPHIA

EDMUND B. GILCHRIST, ARCHITECT



ARE THESE BUILDINGS or gigantic pieces of sculpture? Mr. Ferriss in his idealizations of the American city (The Metropolis of Tomorrow) has well symbolized the present pre-occupation of most of American city architecture with the study of the "mass."

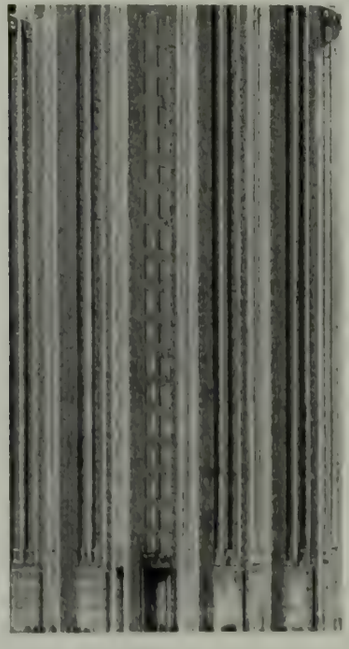
BUILDING OR SCULPTURE?

The Architecture of "Mass"

"Mass" is the word of the street for the prevailing style of American architecture, particularly as applied to the office building; and it is a good word. The rhythms of our tall buildings are free, now, of McKim and his orders quite as much as of Louis Sullivan and his "steel frame." What do they serve? The designer's conception of the stroke and heft of the building—in short, its mass.

That this is not an architecture primarily of structural fact is no invalidation. Every art has the right to be understood in its own terms. Why do architects so often feel constrained to talk about "structure and construction methods as the basis from which design is developed," when these are almost ignored in their plans and renderings—which could be executed almost interchangeably in brick, limestone, marble, concrete, or even aluminum—and when the thing these architects are really after is plainly something else? Particularly in the steel frame building, structure is now so standardized as to offer, for the moment, no major problems; the face is of no structural interest, being pure veneer; the *basic* factor, however, as any architect will recognize, is rentable cubage.

The office building in terms of mass can be called the effort to convert this cubage into a noble monu-



NOT A MODEL but part of a rendering by Mr. Gilbert Hall. "The windows are played down to make the monument look solid."

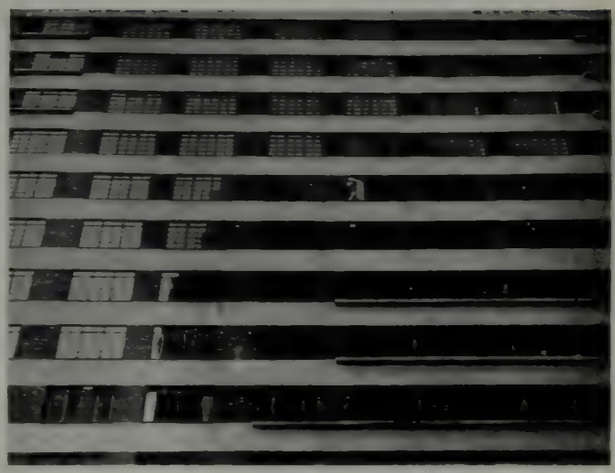
ment to business; and the private house in the same terms is a jewel-box to house the business man's family and his beautiful possessions. If, in the renderings, all the windows are played down, that is a pardonable excess of the desire to make the monument appear solid and permanent. If, to make set-backs, all sorts of hidden liberties have to be taken with the strict economy of the steel frame, that is not only tolerated, for the sake of light in the street, but willingly grasped, for the sake of variety and interest. And the "simplicity" of profile and ornament so much the vogue is not at all the expression of a "truth"—for on many of our buildings of other types, such simplicity just does not exist—but an expression of desire. It symbolizes that business, too, is noble and human: it too has its aristocracy. Movies and the cheap theatre may still burst with plaster-of-paris and gilt for the populace; but the headquarters of large national firms will outdo one another in the effort to proclaim dignity, conservatism, and a suave elegance.

•

Since construction is standardized, and the determining factor in our architecture of "mass" is neither the frame nor the material with which it is faced, but the cubage inside for which it was built, the shell itself has come to have little importance save as decoration. Piers and windows are just line and pattern to help out the mass. What is the difference whether the treatment be vertical or horizontal or both? It is quite at the discretion of the designer. Under the circumstances no great importance attaches even to such innovations as the continuous string windows, so much the vogue in Europe upon smaller buildings. At best these would light only a few more feet in the outer ring. Critics should not be too indignant if such features are just faked, an "effect" without a cause. Even the genuine would be without much cause here. Indeed, the city architect of today is positively compelled to take every license with his lines and openings, in order to deal at all with the difficult problem of camouflaging his haphazard, business-imposed shapes.

•

But the mere fact that in our architecture of mass the openings have become little more than a note on the surface is in itself portentous. This is a condition that has seldom existed above ground before. Even in the dim religious light of the cathedrals there was a better relation to the fenestration. The large office building is a radical departure from the great architectural tradition. By comparison with an early example of its own kind, the Tacoma Building, for example—a brave affair which was all window, light, and air—the present skyscraper is heavy and dark; monumental but not architectural. With all its smooth excellence of design,





HORIZONTAL OR VERTICAL? A face of the Beaux-Arts Apartments in New York City is here turned both ways.

Horizontal or vertical "treatment" is quite at the discretion of the designer, since either is essentially a *surface* affair, not affecting the inside.

Note that in almost all "vertical treatments" a good half of the "piers" are structurally fake.

The Beaux-Arts Apartments with their broad windows make a step away from the idea of solid mass.

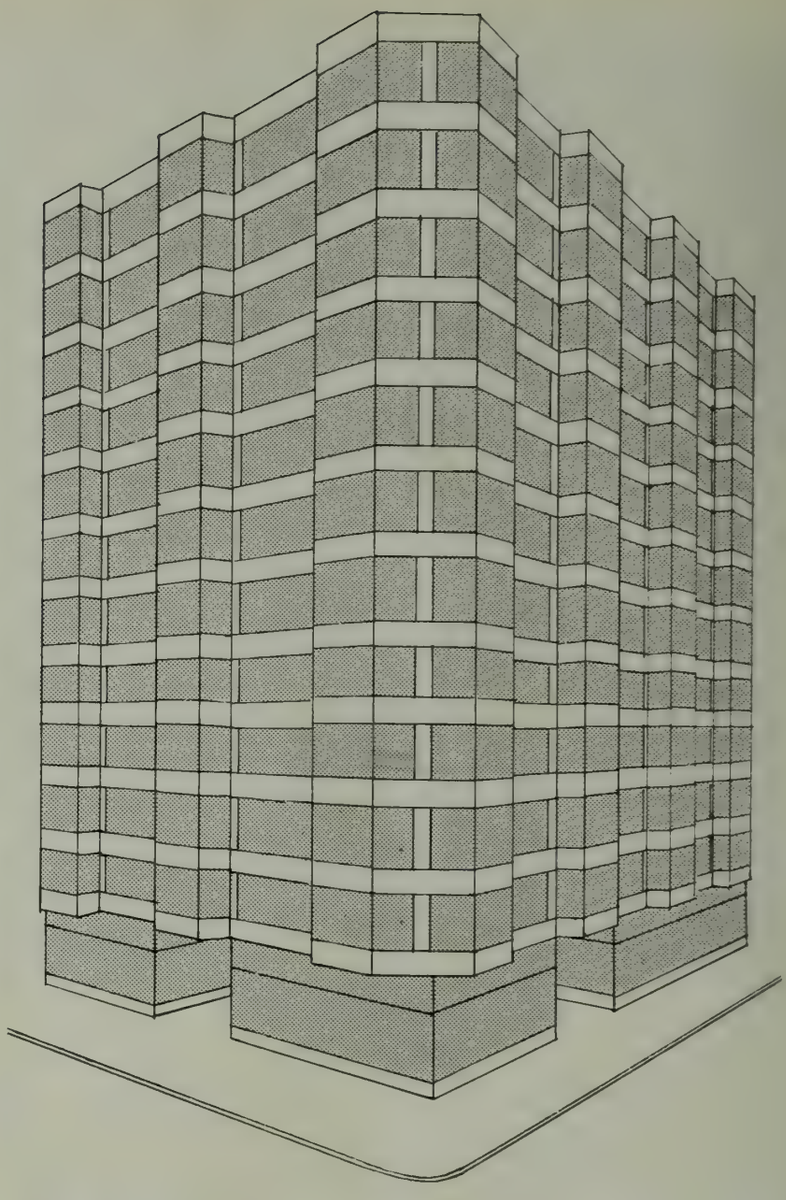
(KENNETH MURCHISON AND HOOD, GODLEY, AND FOUILHOUX, ARCHITECTS)



THE OLD TACOMA BLOCK, CHICAGO

HOLABIRD AND ROCHE, ARCHITECTS

Built in 1888–89



The sketch gives the essential system of the building without the ornament. "A brave affair that was all window, light, and air." Not a closed mass but an open volume. Note also that by confessing the "hung" nature of his building the designer avoided the difficulty with his store windows that attends putting them under solid pyramids.

it carries a straight analogy to the pyramid or the mausoleum. There, too, the windows are played down! Like those, our structures resemble large pieces of sculpture, grudgingly punctured by openings, which to no man's mind can have a deep significance.

Is there no better solution for a well-lit interior than to put it inside a statue and give it electric illumination? Or is electric light so complete a substitute for the light of day? Perhaps it will be; but for the moment we note that executives take the outer offices.

•

To compare the skyscraper with sculpture—carved, so to speak, out of the zoning envelope—is an exaggeration for the sake of truth. The practical exigencies are often exceedingly well met. But even when they are, the *expression* clings stubbornly to "mass." (The idea of mass persists even when a row of store windows at the bottom makes the pyramid as an analogy most embarrassing.) The idea of weight, material, dead tonnage. But is not this the age of the airplane and the suspension bridge? Is there no concept that would permit the designer to catch off his space lightly and deftly, and to face it with a mere veil?

DOUGLAS HASKELL.



THREE SCENES IN VIRGINIA

Linoleum Cuts by Charles W. Smith

Mr. Smith has made these records as an amateur —a lover, that is, of the art and of his adopted state of Virginia. The collection of prints is shortly to be assembled and published in a book.



SCENE IN VIRGINIA

LINOLEUM CUT BY CHARLES W. SMITH



SCENE IN VIRGINIA

LINOLEUM CUT BY CHARLES W. SMITH



Courtesy of the Weyhe Gallery

TAOS

THREE WOODCUTS BY HOWARD COOK

Born in Springfield, Mass., in 1901, Mr. Cook is still a young man, but he has already traveled through Europe, Turkey, China, Japan, and other countries, sometimes as a seaman. His drawing shows what Mr. Arno d Ronnebeck has characterized as a "grave yet lofty acuteness."

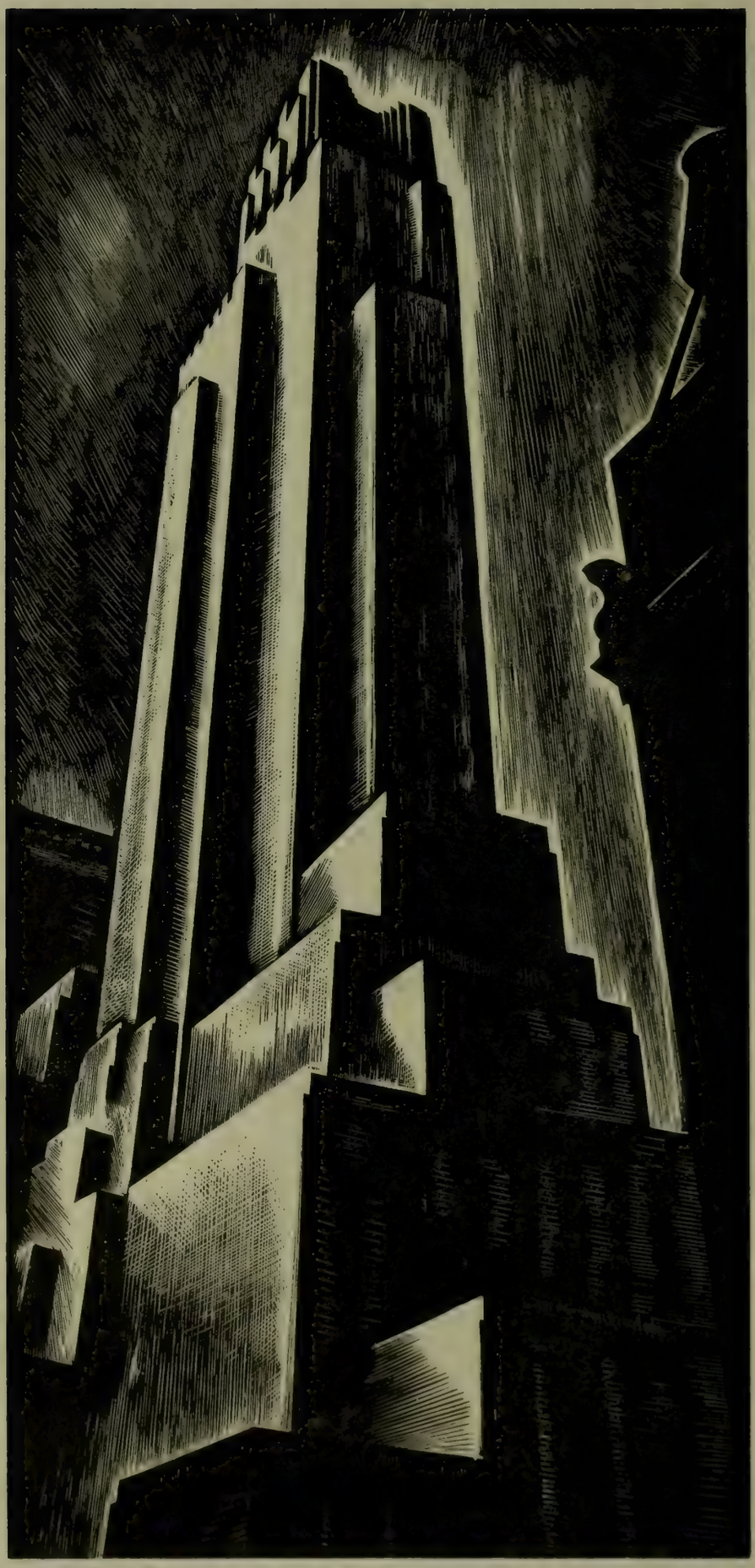
Mr. Cook's etchings, wood engravings, and lithographs, have been shown at the Denver Museum and the Weyhe Gallery (New York), and are represented in the permanent collection of the Metropolitan Museum.



Courtesy of the Forum Magazine

THE DICTATOR

WOODCUT BY HOWARD COOK



Courtesy of the Weyhe Gallery

SKYSCRAPER

WOODCUT BY HOWARD COOK

THE ARCHITECTURAL RECORD

TECHNICAL NEWS AND RESEARCH

APRIL · 1930

THE MINIMUM BUILDING FOR VARYING LAND VALUES

BY W. R. MORTON KEAST AND A. B. RANDALL

NEXT MONTH:
THE THEATRE

A NOTE TO THE READER: In the pages which follow will be found an innovation in the arrangement of reading matter and illustrations. Instead of the regular double-column page there is a single wide column carrying the "text"; all notes, graphs, and illustrations, are placed to the outside as marginalia. The reader will suffer no inconvenience, we believe, if he will but remember that all "footnotes" have become "side" notes. By this arrangement it has been possible to bring most of the illustrative matter next to that part of the article to which it refers, and leafing or hunting is reduced to a minimum.

Those interested in typography will note that there are no "run-arounds," or places where the reading matter has to assume odd shapes in making way for illustrations (since type and "cuts" are held separate); the actual area of the type approximates the average per page in the rest of the magazine; and the area of the illustrations is considerably increased. The page margin has been greatly reduced, and some of the "white space" thus gained now falls between the successive illustrations.

THE MINIMUM BUILDING FOR VARYING LAND VALUES

BY W. R. MORTON KEAST AND A. B. RANDALL*

On pages 378 and 379 are the tables around which this article has been built. The first of these tables indicates a method of analyzing building, land, and financing costs, given various values of land. The second gives a method whereby the architect may analyze his client's specific building project, allowance being made for variations in specific items. The article itself explains the elements that go into these two charts.

The multiplicity of factors involved, and their changing relationship, keep the situation in a state of flux, so that the data submitted with this article are not to be taken as final or as indicating a rule. Yet they give a picture that is fairly complete, and as accurate as careful study could secure.



BUILDING AT MICHIGAN AND GRAND AVENUES, CHICAGO
THIELBAR AND FUGARD, ARCHITECTS

* Mr. Keast is Economist, and Mr. Randall is Research Engineer, of the architectural firm of Simon, Philadelphia.

Acknowledgment is made of assistance given by Mr. John B. Lear, President of the Philadelphia Chapter of the Building Owners and Managers Association, by Members of this Association, and by Mr. F. H. Penson.

I. RATIO OF BUILDING COST TO LAND VALUE

ARCHITECTURE is not only a matter of good floor plans. Rather, these must go together with the appropriate economic solution. After all, economics itself strives, like art, to be an expression of right human relationships. And it is the architect alone who can correlate the economic with the engineering and aesthetic interests.

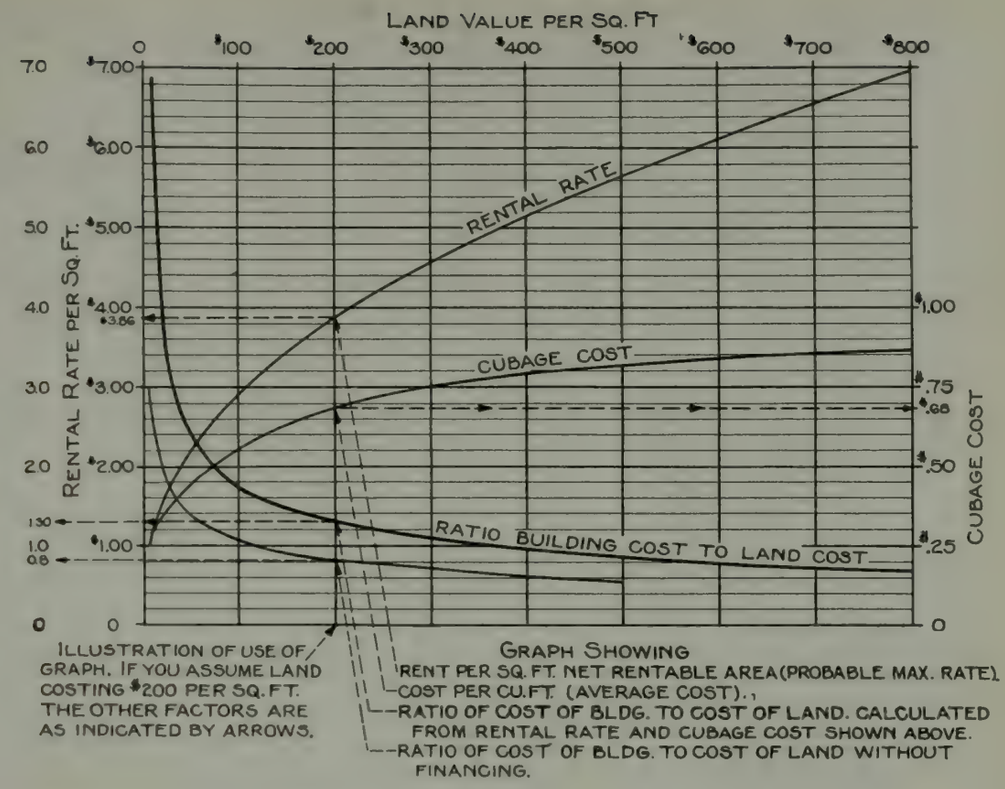
This study analyzes building ratios for present conditions and presents a method for determining an economic building adapted to future trends.

The minimum building—one which will earn 10% on an equity investment of about 20% of the total cost—is taken as a base. The advisability of building beyond this minimum size will depend on the present or probable future demand for space (See page 395).

A series of calculations similar to that on page 378 yields a ratio of building cost to land cost for each of the varying land values. This ratio is shown on the accompanying Graph 1. The heavy *ratio* line includes full financing, while the light line indicates a ratio with no financing fees included. It will be seen that, on the higher land values, profitable operation does not require a much larger building with the financing fees added than without; but on land at $100 or less per square foot the difference becomes very great, so that the fees sometimes double the size necessary for a profitable building.

The method of using this graph is as follows: First, on the known land value the ratio is taken and multiplied by this land value per square foot. This gives a building cost in dollars. This cost is then divided by the cubic foot price of the building, giving a resultant number of cubic feet. Dividing this number of cubic feet by the proper ratio of net area to cubic feet gives the number of square feet rentable. Subtracting the ground floor usable area of 7 square feet gives the balance necessary on the other floors. See pages 378, 379.

The capital cost can then be set up and the income and expense account should balance. The size of this ratio does not mean that the cost of building is greater on low land values than on expensive land values: i. e., on a land value of $100 per square foot, a building is



GRAPH 1. RATIO OF BUILDING COST TO LAND VALUE

required costing one and three quarters times this land value, or $175 per square foot of land area. Assuming a plot of 10,000 square feet, the building cost would be $1,750,000.

On a land value of $350 per square foot the building cost and land value would be equal. Thus with a similar plot of 10,000 square feet a building cost of about $3,500,000 would be indicated.

It may be observed that a variation in any one factor will immediately require an equivalent equalizing variation in another factor or else the accounts will not balance. Land values and rental rates are interdependent factors of paramount importance. A variation of a cent or two in the rental rate will permit or require greater variations in other factors than a similar variation in the building cost or operating cost.*

•

The deductions from the ratio curve indicate the size of the minimum building for today only. Such a determination is the first step in the study. Additional factors, such as increase or decrease of land value, affect the final determination. Further analysis of requirements is given in the division on Changing Land Values.

•

No indication has yet been given of the number of stories required. The reason for this is that the number of stories on a particular plot to produce the same total rentable area varies with the coverage, and with the relationship of net rentable to gross areas.

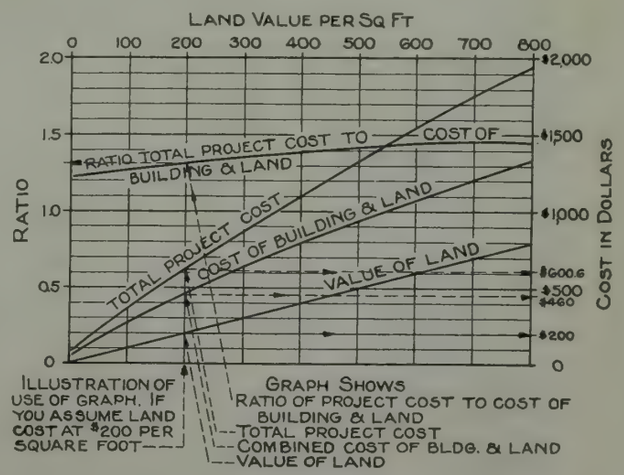
Coverage means *the proportion of the total plot area occupied by the gross area of the typical floor of the building.* (In a set-back building several typical floors are used.) Gross area is *the area included within the perimeter of outside walls. Net area means the rentable area obtained.*

Many factors influence the proper coverage of plot that should be used in any given case. These include the

*QUALITY VERSUS QUANTITY PRODUCTION OF SPACE

In this analysis, the rental rates and the quality of building on a certain land value have been given near the maximum, since this implies the minimum building. It is possible to consider—as in recent cases in New York—a cheaper rental rate as desirable. This immediately implies a correspondingly cheaper building cost, and a greater number of space units to rent—since the land cost must be divided over a greater number of cheaper productive units.

Therefore, although the rental rates are lower, implying lower building costs, yet the resultant building will of necessity be larger in size. Its total cost will be approximately that calculated for a maximum rental rate.



GRAPH 2. TOTAL INVESTMENT FOR MINIMUM BUILDING INCLUDING FINANCING

		$5	25	50	100	200	300	400	500	600	700	$800
A	LAND VALUE											
B	Ratio	11.00	3.67	2.41	1.72	1.30	1.122	0.99	0.873	0.786	0.72	0.654
C	Building Cost	55.00	91.90	122.00	172.00	260.00	337.00	396.00	436.00	472.00	504.00	524.00
D	Cube Cost	0.27	0.36	0.45	0.55	0.68	0.75	0.79	0.81	0.83	0.85	0.86
E	Cubage	203.8	255	268	313	383	450	501	538	568	593	609
F	Cu. ft. per sq. ft. rent area	16.50	17.82	17.90	18.10	18.25	18.50	18.70	18.79	18.87	18.92	19.00
G	Total Area	12.33	14.27	15.00	17.25	21.00	24.30	26.80	28.65	30.10	31.30	32.00
H	Total Area Excl. First floor	11.63	13.57	14.30	16.55	20.30	23.60	26.10	27.95	29.40	30.60	31.30
J	Const'n. Rate Cu. Ft. per month	22.5	22.2	21.5	20.0	18.8	18.3	18.0	17.9	17.7	17.6	17.5
K	Const'n. Time in years	.753	.959	1.037	1.303	1.695	2.045	2.32	2.50	2.678	2.806	2.90
L	Ratio net rentable to plot area	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50
M	Number of Floors	23	27	29	33	41	47	52	56	59	61	63
N	Ground Floor Rental Rate	1.053	1.64	2.23	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00
O	Office Rental Rate	1.053	1.64	2.23	2.87	3.86	4.60	5.18	5.65	6.11	6.56	6.93
CAPITAL COSTS												
A	LAND VALUE	5.00	25.00	50.00	100.00	200.00	300.00	400.00	500.00	600.00	700.00	800.00
C	Building Cost	55.00	91.90	122.00	172.00	260.00	337.00	396.00	436.00	472.00	504.00	524.00
Va	Taxes during Construction L.	.07	.47	1.00	2.51	6.52	11.82	17.88	24.10	30.90	37.83	44.60
Vb	Taxes during Construction B.	.40	.85	1.22	2.16	4.24	6.64	8.85	10.50	12.17	13.62	14.61
V	Int. dur. constr. inc. Tax Rfds.	3.85	9.65	15.48	31.42	71.72	123.80	180.50	233.20	290.20	346.70	398.00
W	Int. Credit on cash	.70	1.53	2.24	4.17	8.73	14.47	20.45	25.55	31.00	36.07	40.28
X	Net int. dur. Construction	3.15	8.12	13.24	27.25	62.99	109.33	160.05	207.65	259.20	310.63	357.72
Y	Fin. Cost	4.92	9.73	14.42	23.35	40.84	58.40	75.10	90.00	104.79	119.30	132.40
Z	Initial Vacancy Cost	3.90	7.02	10.02	15.51	26.03	36.35	45.60	53.68	61.42	69.05	74.98
S	Total Proj. Cost	72.44	143.09	211.90	342.78	600.62	859.54	1103.48	1321.93	1540.48	1754.43	1948.31
CAPITALIZATION												
a	1st Mortgage	47.10	93.02	137.50	222.74	390.39	558.50	716.50	859.50	1002.00	1141.00	1266.00
b	2nd Mortgage	10.87	21.42	31.83	51.48	90.19	129.00	165.50	198.30	231.00	263.00	292.31
c	Equity	14.47	28.65	42.57	68.56	120.04	172.04	221.48	264.13	307.48	350.43	390.00
S	Total	72.44	143.09	211.90	342.78	600.62	859.54	1103.48	1321.93	1540.48	1754.43	1948.31
INCOME												
P	Ground Floor	0.74	1.15	1.52	4.20	8.40	12.60	16.80	21.00	25.20	29.40	33.60
Q	Offices	12.24	22.25	31.89	47.50	78.35	108.56	135.10	157.92	179.60	200.78	216.40
R	Total 100% Occ.	12.99	23.40	33.41	51.70	86.75	121.16	151.90	178.92	204.80	230.18	250.00
T	Total 90% Occ.	11.70	21.06	30.06	46.53	78.07	109.04	136.74	161.03	184.32	207.16	224.94
EXPENSE												
-	Operat'g Rate	.27	.36	.45	.55	.68	.75	.79	.81	.83	.85	.86
d	Oper'g Expense	3.33	5.15	6.76	9.49	14.29	18.25	21.20	23.20	25.00	26.60	27.53
f	Taxes .01925	1.15	2.25	3.32	5.24	8.85	12.27	15.32	18.03	20.62	23.15	25.50
e	Insurance .0012	.07	.11	.15	.20	.31	.41	.48	.52	.57	.60	.63
g	Amortization	1.70	2.93	4.05	6.09	10.00	14.00	17.60	20.58	23.50	26.33	28.08
h	Int. Erngs. & Tax Rfds.	5.45	10.62	15.78	25.54	44.62	64.07	82.14	98.68	114.66	130.48	143.20
T	Total	11.70	21.06	30.06	46.56	78.07	109.00	136.74	161.01	184.35	207.16	224.94

On this Page: TABLE OF CALCULATIONS SHOWING A METHOD OF DEDUCING WHAT IS THE MINIMUM BUILDING FOR VARIOUS LAND VALUES

(Based on square feet of plot area and including financing costs)

On the opposite Page: THE ABOVE TABLE PUT TO USE IN CALCULATING A SPECIFIC PROJECT

($200 land value is used as an example)

PROJECT————————————Type of Building: Office Building

LOCATION————————Area of land: 15,000 sq. ft. Value of Land: $3,200,000.

Based on one square foot of plot.

GENERAL DATA

A.	Value of land per square foot	$200.00
B.	Ratio of Building to land Graph #1	1.30
C.	Building cost A x B	260.00
D.	Building Cost per cubic foot Graph #1	.68
E.	Number of cubic feet per sq. foot of land C/D	383 cu. ft.
F.	Ratio of cubage and rentable area Graph #6	18.25 cu. ft.
G.	Total rentable area E/F	21.0 sq. ft.
H.	Rentable area excluding ground floor G − .7 sq. ft.	20.3 " "
J.	Construction rate per month Graph #11	18.8 cu. ft.
K.	Construction time E/J changed to years	1.695 yrs.
L.	Ratio not rentable area on typical floor to plot area	50%
M.	Number of stories H/L	41 stories
N.	Ground Floor rental rate per sq. ft. 6% of A	$12.00
O.	Office rental rate Graph #1.	3.86

CAPITAL COSTS

A.	Land value		$200.00	
C.	Building cost		260.00	
U.	Taxes during construction (see page 390)			
	Ua. Land-70% x .0275 x K x A		6.52	
	Ub. Bldg-70% x .0275 x K x ½C		4.24	
V.	Interest dur. const. incl. tax refunds			
	Va. 7.0455% x K x S (page 391)	71.72		
*W.	Less int. credit on cash	8.73		
X.	Net int. dur. const.		62.99	
Y.	Financing cost 6.8% x S (see page 388)		40.84	
Z.	Initial Vacancy cost 30% x F (see page 384)		26.03	
**S.	TOTAL PROJECT COST			600.62

CAPITALIZATION

a.	1st Mortgage (@ 6%) 65% x S	$390.39	
b.	2nd Mortgage (@ 7½%) 15% x S	90.19	
c.	Equity (@ 10%) 20% x S	120.04	
	TOTAL CAPITALIZATION		600.62

INCOME

P.	Ground Floor .7 sq.ft. x N	$ 78.40	
Q.	Office rental H x O	8.35	
R.	Total income @ 100% occupied P+Q	86.75	
T.	INCOME @ 90% occupied		78.07

EXPENSE

d.	Operating cost G x rate (graph 13)	$14.29	
e.	Insurance C x .0012 (see page 389)	.31	
f.	Real Estate Tax (A C) x 70% x .0275	8.85	
g.	Amortization 2½% x (S - A)	10.00	
h.	Interest, earnings & tax rfds. 7.445% x S (see page 391)	44.62	
T.	TOTAL EXPENSE & EARNINGS		78.07

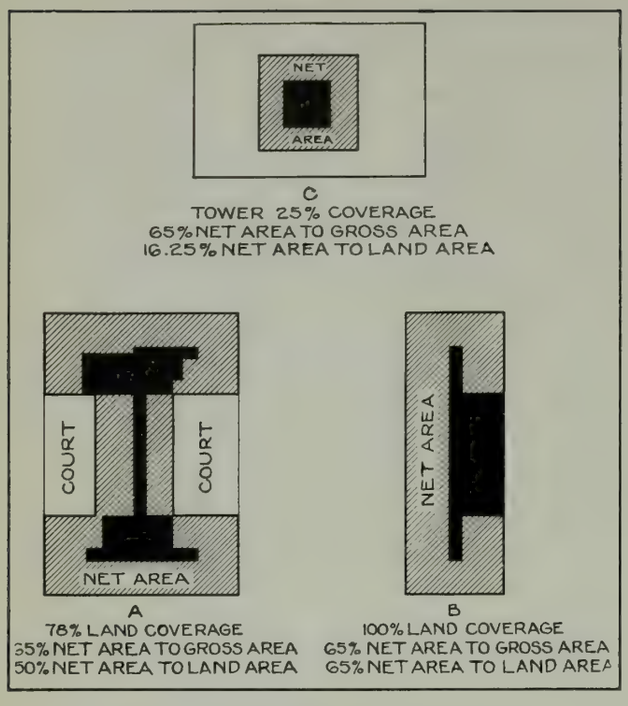
* Interest credit on cash held by trustee and paid out during constr.

S.	Total project cost		600.62
Y.	Less financing discounts Y.	40.84	
j.	" Equity discount 20% x S x K x 8%	16.30	
A.	" land value paid at start A	200.00	
k.	" Total deductions		257.14
m.	Balance cash held by trustee S - K		343.48
*W.	Interest credit 3% x m x K x ½		8.73

** DIRECT METHOD OF CALCULATING TOTAL PROJECT COST

This total cannot be secured by a direct calculation in the standard form since certain elements of the total are percentages of the total, which is unknown at this stage. To avoid several "cut and try" estimates the following method is suggested.

1.	Take sum of A+C+Ua+Ub+Z	496.79	
2.	Add ½ x A x 3% x K	5.09	
3.	Total of #1 & #2		501.88
	Add the following items in terms of % of S		
4.	7.0455% x K x S (int. dur. const.)		11.94%S
5.	Less int. credit on following:		
6.	1st mtge 65% S discounted @ .93	60.45 % S	
7.	2nd mtge 15% S " @ .85	12.75 % S	
8.	Equity 20% S less 20% S x K x 8%	17.29 % S	
9.	Total cash after discounts (6, 7, 8)	90.49 % S	
10.	Int. credit on #9—(3% x K x ½ x #9)		2.30%S
11.	Net interest during const. #4 − #10		9.64%S
12.	Financing discounts		6.80%S
13.	Total of items #11 & #12		16.44%S
14.	Net available % for items #3. (100% less #13)		83.56%S
15.	TOTAL PROJECT COST #3 / #14		600.62



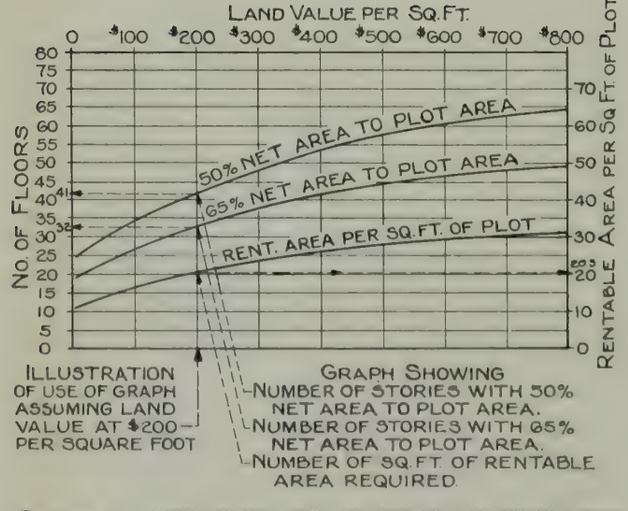
GRAPH 3. COVERAGE DIAGRAM

size and shape of the plot, and light and air conditions affecting rentals. Studies are required in order to compare situations where, on the one hand, a large coverage may be gained with poorer light and air and consequent reduction in average income, or, on the other hand, a smaller coverage may yield superior space. Offices of a greater room depth than 28 feet are not first-class office units and tend towards loft standards, with correspondingly lower rental values. With depths beyond this limit a higher ratio of net area to gross area may appear, but the reduction in value of such space may more than offset the apparent gain from the increased area provided.

Rental advantages are often gained by a higher building with less, but more valuable, space on each floor, and with progressively higher rentals on upper floors.

Records of office buildings indicate an average coverage of the land by the typical floor of about 78%. With the losses due to walls, corridors, elevators, and other service spaces, the normal ratio results of 65% *net* area to *gross* area. This gives a proportion of *net* area to *plot* area of about 50%. In special cases, with certain shapes of land, the gross area can cover the entire plot. In such a case the 65% ratio of net area to gross area will also be the ratio of net area to plot area. See Graph 3.

Using these ratios, a tentative indication of the number of stories may be obtained for the coverages shown. This is given in Graph 4 and may be adjusted for other ratios of coverage, or for partial variations, to give an approximate suggestion of the size of building required.



GRAPH 4. NUMBER OF FLOORS NECESSARY

RATIO OF CUBAGE AND RENTABLE AREA

The rentable or usable area in a given building depends on many factors, among the principal of which are the size and proportions of the lot, the set-backs and light courts, and the space taken up by utilities. These factors determine what may be called plan efficiency, which is usually expressed by a *ratio of the net usable or rentable space to the gross floor areas*.

The plan efficiency of a typical office building with offices of proper depth will usually come to about 65% or 70% of the gross floor area. This ratio of 70%, applied to a typical office floor of 11′ 6″ height, shows that about 16.4 cubic feet of building are required per square foot of office area. In loft buildings this cubage may be considerably reduced, since there are no corridors and few facilities developed on the open undivided floors; and a ratio may obtain of 80 to 90% usable to gross area.

When any entire building is considered, the number of cubic feet built per square foot of rentable area developed will exceed the proportion shown above, which is based on *one floor only*. Construction cubage is required for the mechanical and boiler plant, elevator overruns, machinery and pits, pent houses, pipe, lofts, service employes' quarters, and storage space, roof and miscellaneous construction, and special extra-height floors. These factors make an appreciable increase in the cubage per square

foot of rentable area. Examples of office building construction demonstrate that this will vary from about 17.5 to 19.0 cubic feet per square foot of rentable area, depending on the building floor heights and upon the building size.

The cheaper buildings on cheaper land, carrying relatively lower rental rates, may be expected to have somewhat lower floor heights, while in the more expensive buildings, the reverse may be expected.

In larger and higher buildings, the utilities increase, and reduce the ratio of net to gross areas, tending to increase the cubage per square foot of rentable area.

Ratio of cubage to rentable area is shown in Graph 6.

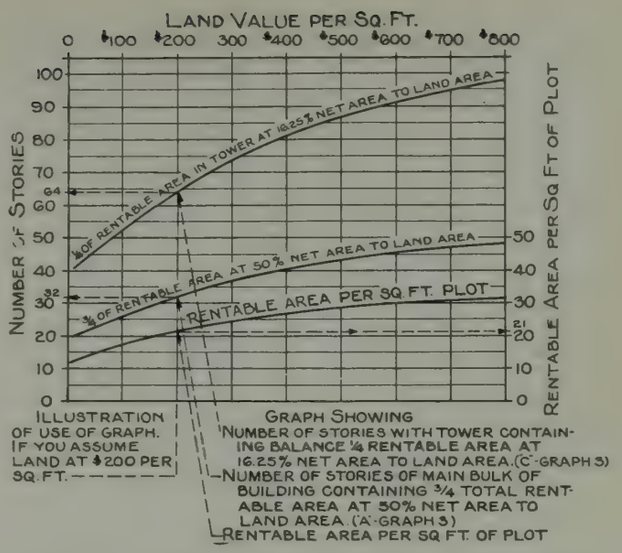
INCOME IN RELATION TO LAND VALUE

The income derived from office buildings is the rental (or rental value) of ground floor and other space. Rental value and land value are closely related. The same preference reflected in the land value has a resultant in rental value. It is easily understood that a land value of $50 a square foot, on the edge of a district, could not command the same rental return for space in a building erected on it as could land worth $300 per square foot.

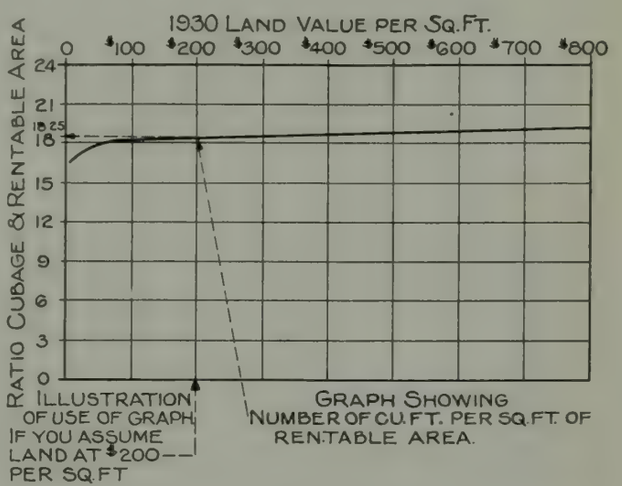
While this differentiation is very apparent in ground floor rental values, it has also a great effect on the rental rates of the office floors. Ground floor rentals, on the basis of a large number of examples, seem to average their space value at a rate of approximately 6% on the land value per square foot. Since the area rentable on the ground floor is only about 70% of the plot area, the product of 70% times a rate per square foot of 6% of the ground value gives a very close approximation to the income that may be expected from this source. There are some theories according to which the ground floor rental will carry the land including interest and taxes; but even the best examples actually analyzed in this study did not give returns greater than those indicated above.

In addition to the relation of land value to office rental rates, there is another factor present in the relative quality of the building. It is obviously improper to put a first-class building on third-class land; conversely it is necessary to erect a first-class building on first-class land in order to obtain maximum rates. With the proper quality of building, therefore, the rental of offices on varying land values, and their relation to each other, have been plotted on Graph 5. The curve shown is placed at the *maximum* rental probable in a building on a given site value, in order that the analysis may show the *minimum* size of building required.

Rental rates for offices are subject to variation based upon exposure and upon the height above the street. Rentals for spaces lighted by courts are often much lower than those on the outside; space on higher floors brings a markedly better rate than equal space on lower floors. Graph 6 indicates in a general way the variation of the average rental rate per floor for similar floors in a typical office building. The peak or rise of rate value at the center represents the floor where two express and local

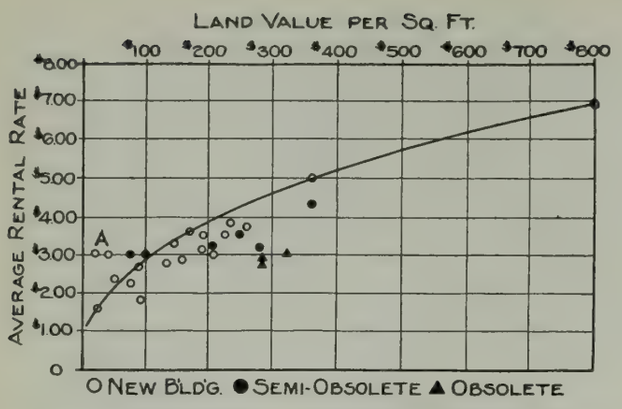


GRAPH 5. NUMBER OF STORES IN A TOWER BUILDING



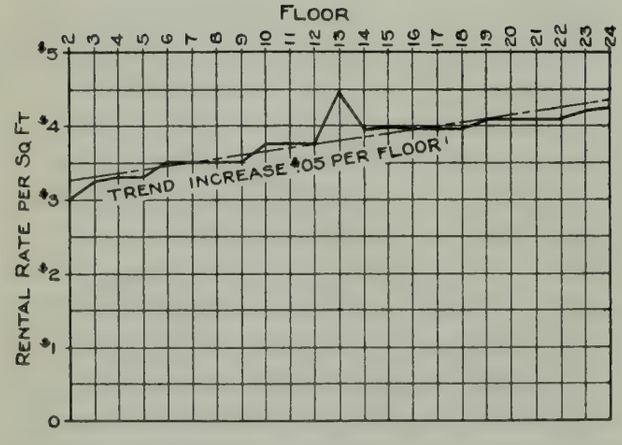
GRAPH 6. RATIO OF CUBAGE TO RENTABLE AREA

From the study of a group of buildings this graph was drawn as exhibiting the most reasonable average assumption for the relationship between rentable or income-producing area and the cubage necessary to develop such areas. This relationship depends upon office depth, ratios of net to gross areas, floor heights, and provisions for utilities and services. On cheap land of low rentals it is obvious that lower ceiling heights will be usual, while on land of intensive value with high rents the reverse should hold. Further, in very large and high buildings, the utilities including vertical transportation facilities will tend to increase the cubage required to develop a unit of rentable area.



GRAPH 7. STUDY OF ACTUAL RENTAL RATES. *Method used to determine probable maximum average rental rate for all floors of an entire building (except first floor).*

It is noteworthy that two buildings on low land values with rental rates far in excess of the probable maximum shown have had over the last five years a vacancy of much over 25%, thereby causing losses of proper returns to the owners. Further they are still so far out of line that obsolescence will render the buildings valueless before their present rates are warranted by increased land value.



GRAPH 8.
Preference of tenants for the upper floors of office buildings is indicated in the increasing trend of average floor rental rates (excluding the first floor). The peak shown at the 13th floor indicates the location of the transfer floor served by more than one group of elevators.

banks of elevators give accessibility from both the upper and the lower zones of the building.

Where there are undivided floor areas of abnormal depth, as in loft buildings and in certain of the lower zones of office buildings, the ratio of net area to gross area is larger than in first-class buildings. Rental rates should then be weighted. For instance, in a loft building of 85% net area to gross area, an office rate of $2.48 per square foot would be equivalent to a rate of $3.24 per square foot on a ratio of 65% net. Due weighting must be made in such areas for these factors.

II. FACTORS USED IN COMPUTING MINIMUM BUILDING

Owners are often misled by omission of items of "capital" cost.

It is extremely important to an owner to know accurately all costs that will enter into the "change-over" contemplated on his property. If all of these costs are not included in the financial plan, and additional capital is later required, an owner may be forced to refinance, thus adding additional fees and costs to his project. This often results in disaster, since the project had not been planned to cover the interest and other charges on these additional costs.

ITEMS OF CAPITAL COST

LAND VALUE. (See also Section III on Land Values.)

This includes all real estate, transfer, and legal fees, title insurance, and carrying costs involved up to the point of demolition for the new project. Ground is usually purchased on the basis of the front foot. Ground floor space is likewise often evaluated by frontage. However, practically all other space is based on the square foot, as are also building costs and operating expenses. It has, therefore, been found most convenient to use the basis of one square foot of land value.

BUILDING COSTS

These include all items pertaining to the construction of the building, including contractors' fees, surety bonds, insurance during construction, architect's and other professional fees. Data collected from a large number of office buildings indicate a variation in costs—from 50 cents to upwards of 85 cents per cubic foot. These are exclusive of such interior decoration as may be added by ground-floor or other tenants, which in the case of a bank, for instance, may amount to a large sum, but which is fairly charged to business requirements exclusive of the space-value of the building. On the less expensive land, buildings costing less than 50 cents a cubic foot pass into loft, warehouse, and garage classes, and continue down to 20 cents a cubic foot as shown.

The accompanying Graph 9 gives a fair comparison of building costs relative to land values, with examples of buildings plotted thereon. The curve shown has been used as a basis of calculation for average building costs on varying land value.

CARRYING COSTS DURING CONSTRUCTION

These are a necessary cost and capital charge, and enter into the cost of every new building development. From the commencement of demolition to the occupancy of the completed structure, interest must be paid or accounted for on all money expended in the project. If the customary method of a first mortgage bond issue, followed by second mortgage bonds and the balance of equity money, has been employed, interest must be allowed on all these various parts, although a certain credit is allowed on that portion of the cash held by the trustee and paid out by him as the work progresses. State and federal tax refunds are also to be included for this period.

Taxes must be paid on the land assessment during the entire time of the construction of the building. The building assessment will gradually increase over the time of building until at its completion a total assessment is reached. The average of building taxes will therefore be based on one-half the final building assessment over the period of construction.

The time of construction of a large building will vary from less than a year to upwards of two and a half years in certain cases, commencing with demolition and continuing up to the time of opening, ready for tenants. The construction records of a group of representative buildings were analyzed and plotted and the accompanying Graph 10 indicates the average results. It was to be expected, of course, that the less expensively finished types of buildings would be erected at a speedier rate and in a shorter period than expensively finished buildings containing a higher quality of materials, and refinements of workmanship.

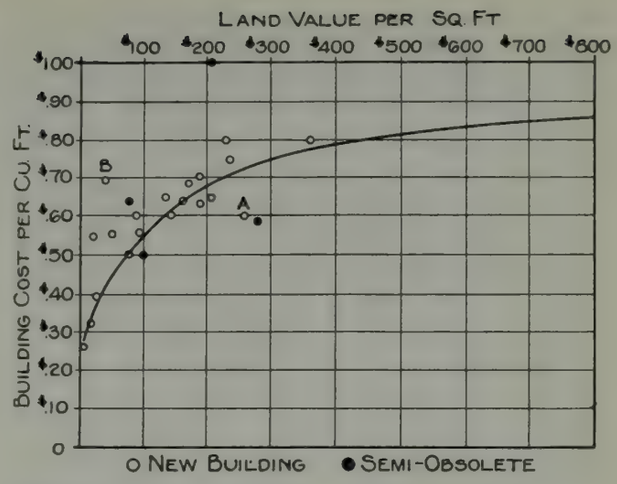
IMPORTANCE OF RAPID CONSTRUCTION

When one considers the mounting interest and tax costs, the importance of rapid construction cannot be overestimated.

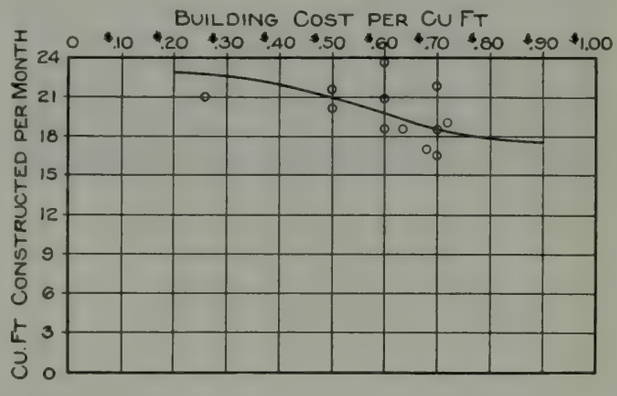
When buildings become of such size that the time of construction is a factor of great importance in cost, this time may be reduced by the use of additional shifts of workmen.

Some of the speeding can be effected by the delivery of materials at times other than the rush hours on the streets, and this saving has been included in the calculations. The doubling or tripling of shifts may possibly be carried further. The additional costs involved must not exceed the saving made on interest and taxes over the time involved.

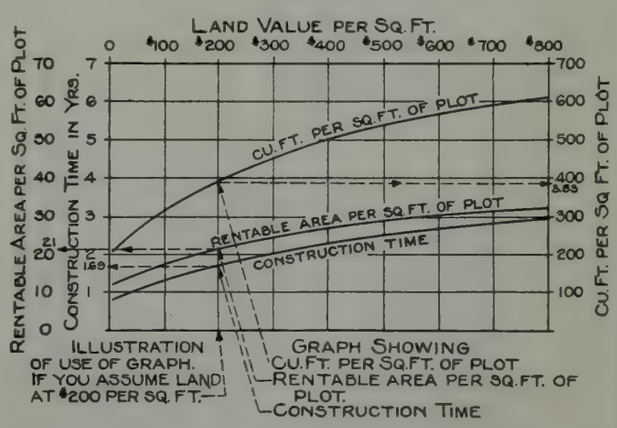
It must also be remembered that some construction records exclude time of demolition, and sometimes even time required for foundations, and only include construction to the time of installation of the first tenant in a particularly favorable location. The time factor included herein has been that upon which interest cost must be based and includes the other items as well as the superstructure of the building. (Graph 11.)



GRAPH 9.
Showing plottings of representative office buildings in several cities, the majority of recent date of construction. The older buildings are plotted, allowing for changes in costs between their construction dates and the present year.



GRAPH 10.
Records of a group of buildings are plotted here on the basis of construction per month per square foot of plot area, as giving more accurate results than those of total cubage or dollar value of construction, or floors per month.



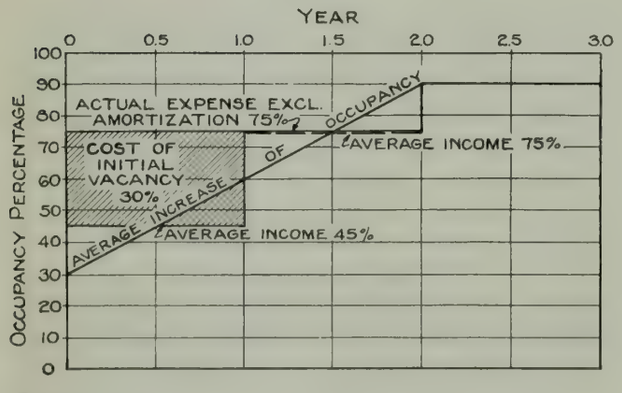
GRAPH 11. CUBAGE: RENTABLE AREA AND CONSTRUCTION TIME FOR MINIMUM BUILDINGS



Photo. Luckhaus Studio

WILSHIRE PROFESSIONAL BUILDING, LOS ANGELES

A. E. HARVEY, ARCHITECT



GRAPH 12.

This graph represents a comparison of an average increase in occupancy with the expense excluding amortization for the first two years after opening. A deficit of income to meet the expense in the first year is indicated, which may be evaluated as approximately 30% of a year's possible income, based on 100% occupancy.

The second year should balance, excluding amortization, while the subsequent years until obsolescence should not only cover amortization, but yield the minimum 10% return on the equity which is assumed as the least return attractive to owners.

INITIAL VACANCY COST IS OFTEN OVERLOOKED

This very important cost of "change-over" involved in new construction is frequently overlooked. The owner may realize that the loss incurred from the time demolition starts on the old building until the new building is ready for occupancy should rightly be charged as a cost, yet it is frequently forgotten that this loss or cost continues until such time as the building has reached occupancy and a resultant income which will meet all expenses.

In the period of demolition and construction the costs include taxes on the land and building, interest, and State and Federal tax refunds. In the subsequent period when the building is partly occupied there are added full taxes, the costs of operation, and insurance. Amortization is usually postponed until after the first or second year.

The danger of overlooking the initial vacancy costs is a serious one for an owner who cannot unexpectedly add to his equity investment but must needs meet this additional cost by additional financing. The costs of such refinancing are increasingly heavy and add considerably to the capital costs. Further the carrying charges involved often result in a building that is too small to give a proper return on this increased capitalization.

There are few buildings which attain or hold an occupancy of 100% for any considerably period. Study of office building occupancy shows that the normal average is about 90%, but that this is seldom attained the first year or two. Apartment houses are seldom estimated for normal occupancy of more than 80%, and hotels about 70% to 75%.

A study of a group of buildings built in good districts and held at general market rentals showed an average occupancy at opening date of approximately 30%, secured during the period of construction by renting from the plans. At the end of the first year this would increase to about 60% and the following year to the normal 90% occupancy. This indicates an average occupancy the first year of 45% and the second year of 75%.

A study of the costs that must be met during this period gives a total of about 75% of the possible income, i. e. the rent from 75% occupancy. These costs include operating costs, insurance, taxes, interest, and a risk value of 8% on the equity money for its use over this period. (Amortization is not charged the first year or two. It can be postponed until normal occupation is reached.)

The first year's income of 45% consequently falls short of the costs (75%) by an amount equal to 30% of the total possible income. The second year the accounts approximately balance (see Graph 12).

FINANCING

The total capitalization of an improvement is usually made of *first mortgage*, *second mortgage* and *equity* under a variety of names and forms. In some cases the equity holders are given a form of *third mortgage bonds* along

with common stock. The investment is covered by these bonds and any increment in the value of the property is reflected in the value of the no par stock. Certain other methods of financing with preferred stock have been used.

Financing a project by means of mortgages or mortgage bonds is usually accomplished by one of two general methods. The first is through a *trust company mortgage*, and the second by means of a *bond issue* through investment bankers. There are various types of intermediate methods including the case where a first mortgage is obtained as in the first method, followed by a second mortgage from a building and loan association or similar institution. Such an intermediate method would cost the owner financing fees upon a portion of the capitalization only.

The *trust company* or *institutional first mortgage* is often arranged without financing fees or discounts and is usually granted 60% of an appraisal made by the trust company. This appraisal often does not allow for certain items which enter into the actual cost of the change-over, such as interest during construction on second mortgage and equity value, initial vacancy cost, and architects' and other professional fees. Therefore this 60% of their appraisal becomes less than 60% of the actual total costs.

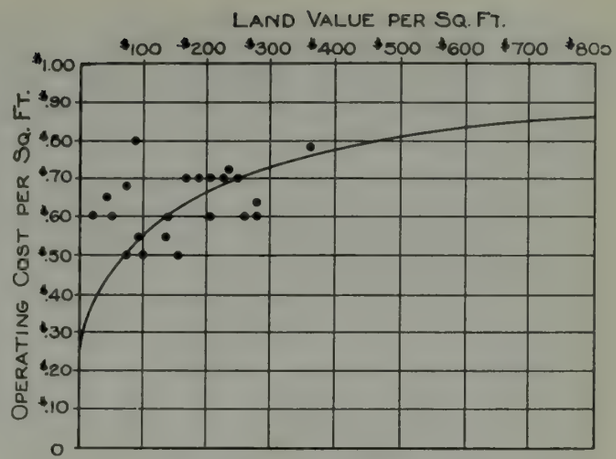
The bond issue on the other hand is often made upon an appraisal which includes these items and fees in the total costs of the change-over, or on an income basis capitalized, which is substantially equivalent. The security of the real estate permits a first mortgage up to 65% of the total appraisal in New York and other states. The second mortgage and equity are therefore smaller than required under the first method.

It may be observed here that the choice between these two methods depends rather upon special factors affecting the owner. The trust company, since most of its funds are under the jurisdiction of an orphans' court or other legal tribunal, and in fact are estates of one kind or another, usually requires a greater protection in the amount it will loan than the investment banker, who takes the slightly greater risk of the larger issue.

It is therefore not intended to suggest one method as against the other, but rather to figure with the one which costs the most, so that, although these costs may not be required at first, the project will still be in safe ratio to the land value should they be necessary later.

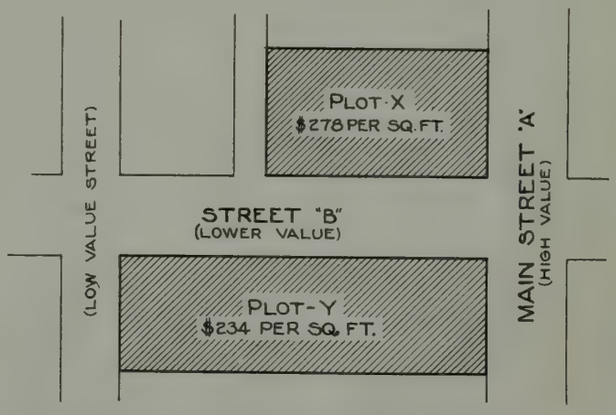
It is also noted that on high values of land the mortgages become of such size that few companies are large enough to take them alone, or willing to forego the consequent diversification of their funds.

Note that in the *lower range* of land values (from $1 to $100) the extra size necessary in the building to compensate for full financing is so great that the tendency here is toward the *trust company's mortgage* method. The trust company can take the entire mortgage without endangering the diversification of its investments, because the amounts involved are small.



GRAPH 13. OPERATING COSTS PER SQUARE FOOT ON VARYING LAND VALUES

Showing the line of mean operating costs



GRAPH 14. VARIATION IN LAND VALUE DUE TO DIFFERENCES IN FRONTAGE



Photo. c. Fairchild Aerial Survey

THE SHIFTING CITY SCENE. The Grand Central district in New York City in 1922. Compare it with the same region in 1929, as shown opposite

Bankers must eventually take a broader responsibility to the community, and to other investors than those applying to them. An individual borrower may have sufficient resources to cover a project which from the standpoint of the community represents inadequate utilization of land, or, conversely, serious overbuilding.

Full financing should be used on high land values.

In this analysis the second method, namely that of the *bond issue* and complete financing, will be considered as a fundamental one, and as a proper economic basis upon which a large structure should be designed. The reasons for this include the fact that even though the owner may not elect complete financing, the relation of the risk values of the various parts of the investment are better expressed in this method than in the other.

Only a minority of owners are in the position of having the capital themselves, and should they elect thus to finance a project (without allowing for financing charges in determining its size) this decision may easily work to their future detriment, should they ever desire to sell the land and its improvement. The prospective purchaser, should he require financing, as the majority do, will find that he has to add these costs to his capital



Photo: Fairchild Aerial Survey

THE SHIFTING CITY SCENE. The Grand Central district in New York City in 1929. Although such an expansion in the buildings of a region is tremendous, the prudent operator realizes that some of the most imposing statistical summaries of it are not to be taken at face value. This is due in part to the shifting purchasing power of the dollar itself, discussed on page 391. "Land that has apparently doubled in value over the last 25 years has actually remained only static in worth, since the dollar will buy only one half of what it did 25 years ago"

expenses when he takes over the property. If therefore the property improvements are designed to produce the requisite return on only a lesser capitalization without financing costs, this rate of return will obviously be less on a greater capitalization with new financing costs included. Such a condition actually implies a lesser value of the property to this majority of purchasers, and a probable loss in resale value to the original owner.

Should the present owner himself desire at any future time to obtain full financing on his property, this basis of calculation will provide him with a proper size of building without loss to himself.

Further, in very large projects, the granting of a mortgage by one institution may mean such a large sum that such institution will be unwilling to forego the principle of diversification of its investments and hence limit the application of the former method of financing.

One type of complete financing may enable an owner to obtain bond issues up to about 80% of the total project cost. These issues will have a cost varying with the conditions of the money market and with the prestige of the project and its owners. However, the average risk values of the various parts of the money



DETAIL FROM PRELIMINARY SKETCH OF APARTMENT IN CHICAGO
BOWMAN BROTHERS, ARCHITECTS

entering into the capital cost of the improvement may be expressed as follows: A first mortgage of 65% of the total appraisal at 6% interest and with financing fee or discount of 7 points, yielding a net of cash of 93% of the face value of the mortgage; a second mortgage of 15% additional at 7½% interest (whether obtained by premiums, discounts, or straight interest), at a fee, or discount of 15 points yielding cash of 85% of its face value.

Thus the total financing discounts can be expressed as the sum of 65% of the total at 7 points or 4.5% of the total capitalization, and 15% of the total at 15 points or 2.25%, making the total discount fees equal 6.8% of the total capitalization.

ANNUAL OPERATING EXPENSE

Operating expense, usually figured on a basis of cost per square foot of rentable area in a building, includes the following items: Cleaning and janitor service; heat, light, and power; elevator operation, ventilating, minor alterations, decorating and building repairs, and insurance exclusive of fire insurance on the building.

The Building Owners and Managers' *Experience Exchange Reports* indicate a range of cost from about 50c. to $1.00 per square foot rentable area per year, obtaining for a large number of buildings of all ages and in many cities. A study of this item as applied to known buildings indicates clearly that as land values and rentals increase, operating costs may be expected to increase, better service being demanded by the tenants. Operating costs too are greater in an old building than in a new building. A study of a group of representative buildings suggests that the operating cost in cents per square foot of rentable area is substantially close to the building cost in cents per cubic foot. Graph 13 illustrates the trend of operating costs that may reasonably be expected in buildings suggested on land of varying values. (Page 385.)

TAXES

These may be divided into two general classes, that of the *city* or *real estate tax*, and other taxes such as the Federal Income Tax of the owner, or certain state and federal tax refunds on the bond issues. This last item is best considered with the interest costs. The income tax of the owner has not been included in this study.

The *real estate tax* consists of two principal factors, the total tax rate and the basis of assessment. From general observation, an average of $2.75 per $100 of valuation assessment, and an assessment basis of about 70% of the value of the building and land value, have been taken as representative of the general cross-section. This rate as well as the basis of assessment may vary somewhat, but the product of these factors seemed generally to converge.

Taxes as applied to the project during construction have already been discussed under the head of carrying charges during construction.

INSURANCE

This cost is one of the smallest in the annual budget, but warrants consideration since a variation may involve a large sum-total for the life of the building. When a section or zone devoted to garage use is included in the building, or some other use that is considered more hazardous than offices, the insurance rate may be expected to increase. An instance is known where the inclusion of certain garage floors resulted in a rate of about 30c. per $100, while in another instance, of a building with a low hazard, the rate was less than 10c. In this study an average rate of 12c. per $100 has been taken as a reasonable average for office buildings.

AMORTIZATION

The tangible factors limiting building life have been termed *depreciation*, or a gradual physical wearing out of the building's component parts. The intangible factors have been termed *obsolescence*. These include changes in style, uses, and customs, advances in the art of construction which render the old building less desirable to tenants, losses in light and air due to the construction of neighboring buildings, and losses due to *inadequacy* or other causes.

Inadequacy is of paramount importance since it may cause a building to become valueless even though physically still excellent. Land value may have increased twofold to fivefold, with a corresponding increase in tax burdens and interest value. Rentals may have increased, but not proportionately, since competition from newer buildings tends to force rentals from obsolete buildings downward. Net income eventually disappears; the building has become obsolete due to inadequacy and must be replaced.

INCREASES IN LAND VALUE DO NOT ELIMINATE NECESSITY OF OBSOLESCENCE FUND

A view has been frequently expressed that there is no need to set aside a sum to meet building obsolescence because the decrease in value of the improvement is offset by the increase in value of the land. This is based, upon the fallacy that land is always increasing in value, and at exactly the same rate as the building diminishes. This assumption by an owner is likely to lead to disaster.

However, even though this depreciation happens to be balanced by land-value appreciation, with the result that after a given period of years the original equity value in dollars remains intact, there is another aspect of the situation far more important which is often overlooked.

With increasing land value the owner may find that his original equity, however carefully preserved, is absolutely inadequate to build the size and type of structure that is required on the *new* land value.

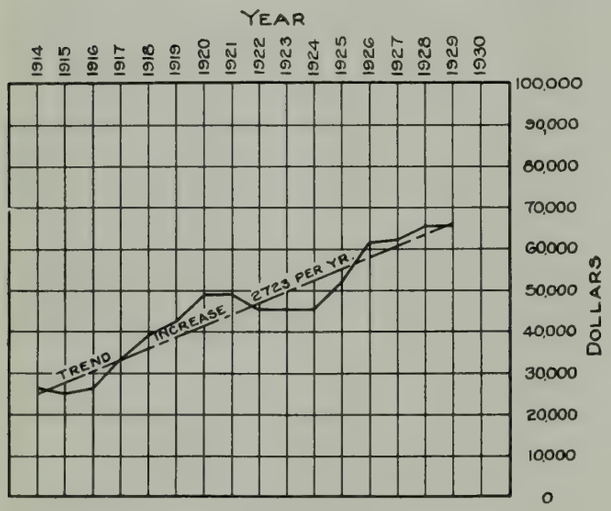
The owner must therefore not only preserve his equity investment intact, as a sum of money, but must preserve its ratio in such a proportion that at all times he retains his original ability to build. (See "Economics of the Land," page 392.)



Photo. Moulin

PRELIMINARY SKETCH
THE SHELL BUILDING, SAN FRANCISCO
GEORGE W. KELHAM, ARCHITECT

Replacement costs are at a minimum in a new structure, and tend to increase progressively with time. These costs must be added to the capital account. However, there is not the advantage of compound interest to any large extent, as is found in obsolescence accounts. Depreciation will occur on many of the elements of a building to an extent of one or several replacements over its economic life. Items of foundations, structural steel, concrete, brickwork, and facing; permanent partitions, exterior finish, and the like, are usually more durable than the economic life of the building. Parts of roofing, mechanical equipment, elevators, electric work, heating and ventilating, are likely to require partial replacements over certain periods. Minor repairs are usually attended to under current operating charges, but major replacements or improvements are often made to keep up with increased demands for service.



Graph 15. TAX INCREASES
A study of taxation over a period of years indicates a fair increase in the costs of government. This graph shows the increase in taxation on a central Philadelphia property is also applicable to nearly every other city. Composite studies for future buildings will of course make proper allowance for such costs, in order to proportion the results to a minimum of losses, whether expressed in the capital or in the income account.

* This is not a basis to be used for income-tax purposes since most buildings are inadequate to the land and hence require a greater amortization than one properly proportioned.

MAINTENANCE OR DEPRECIATION

In general it is not unlikely that sums totaling about 30% of the initial building cost will have to be expended in the 25 to 35 years of a building's life, to maintain it in a satisfactory state to retain tenants. This would result in an estimated average allowance of about 1% of the project cost, less land, per year, for depreciation maintenance and replacement. (See note at left.)

A certain outstanding building has published accounts giving the expenditure on renewals and replacement per year as a little over one-half of one per cent of the building's cost. This building is exceptional in many ways and is balanced by others which set aside slightly more than one per cent per year.

Thus the sum-total allowance in buildings of economic proportion, for both obsolescence and maintenance, may be taken at 2½% of the total project cost exclusive of the land.

Of this 2½% per year, 1% should go to replacements, and 1½% should be set aside as a sinking fund bearing at least 5% interest compounded, for obsolescence.

Should the bond-holders or bankers require a larger amortization of mortgages than is here outlined, the additional part of the sum is actually a surplus account taken from equity income and reinvested in the property, and is over and above the sum actually required for maintenance of the investment and equity ratios.

INTEREST EARNINGS AND TAX REFUNDS

The interest payments include interest on the first and second mortgages with additional costs for tax refunds paid at the source.

The rate of the first mortgage may be taken at 6% per year. Favorable conditions may reduce this slightly; however, other factors such as the type of building, its character and quality, may increase the rate due to increased risk. Hotel and apartment projects are possible examples of this.

The risk of the *second* or *junior mortgage* is greater than that of the first, and this is reflected in the interest rate. A fair average of 7½% interest per year may be taken as a general cross-section, although this in name is not universally applicable. In states where a lower legal limit is set for interest rates, it is customary to obtain compensation for the increased risk of the second mortgage by means of additional fees, discounts or premiums, as in building and loan associations.

Equity earnings, which may be considered as an interest cost to be met annually, have been set at a minimum of 8% during the construction and the initial period of the building, and at 10% thereafter. This was considered the least that would reasonably attract investors, with the risk involved. The minimum building has been calculated on this basis. Larger buildings would sometimes increase this rate under advantageous conditions, and would thus provide more attractive propositions.*

The tax refunds, when paid at the source by the owner,

are practically an additional payment for the bond holders. The Pennsylvania State Tax is typical of the state taxes: it is four mills on the bond issue, which may be substantially 80% of the project cost. The Federal Income Tax Refund amounts to 2% on the mortgage bond interest.

The total of interest, equity value, and tax refunds during construction, may be added together as follows:

First Mtge.	6 % on 65%	total is equivalent to	3.9 %	total
Second Mtge.	7½% on 15%	" "	1.125 %	"
Equity value	8 % on 20%	" "	1.6 %	"
State tax at	.004 on 80%	" "	.32 %	"
Federal tax	2% on int. 1st & 2nd Mtg. 5.025%	is	.1005%	"
	Sum of costs above is equivalent to		7.0455%	of total

The interest, equity earnings, and tax refunds after construction, give a total sum as follows:

First Mtge.	6 % on 65%	total is equivalent to	3.9 %	total
Second Mtge.	7½% on 15%	" "	1.125 %	"
Equity earn.	10 % on 20%	" "	2. %	"
State tax ref.	.004 on 80%	" "	.32 %	"
Federal tax	2% on int. 1st & 2nd Mtg. 5.025%	is	.1005%	"
	Sum of annual charges above is equivalent to		7.4455%	of total

DEVELOPMENT OFTEN A MATTER OF COVERING LOSSES

Many buildings owe their existence entirely to the need of their owners to cover the accumulated losses accruing on their undeveloped properties in the form of taxes, carrying charges, and interest. Nevertheless the true value of a property is based not on this cost but on its *potential earning capacity*. The value of land is merely the pre-discounting of its potential earnings for a reasonable time into the future.

There have been periods and districts in which land values have been inflated far beyond their income possibilities present or future. The return from space is primarily based on the current market; production costs must be adjusted to this income. Yet—

III. BUILDING COSTS MUST BE ADJUSTED TO TRUE LAND VALUES

Urban land is affected by three very important factors: Area, location, and zoning restrictions.

1. *Area:* Costs and values are so high today that it is often necessary to combine several plots to develop a profitable building.

2. *Location* value is heavily dependent on preferences of the public.

3. *Zoning:* The Equitable Building at 120 Broadway, New York City, erected before the enactment of zoning ordinances, is said by the *Wall Street Journal* to contain over one-third more space than would be possible now under the new regulations.

EXAMPLES OF TRENDS IN LAND VALUES

In a study of trends in land values over a period of time the official records of land assessments of the Times

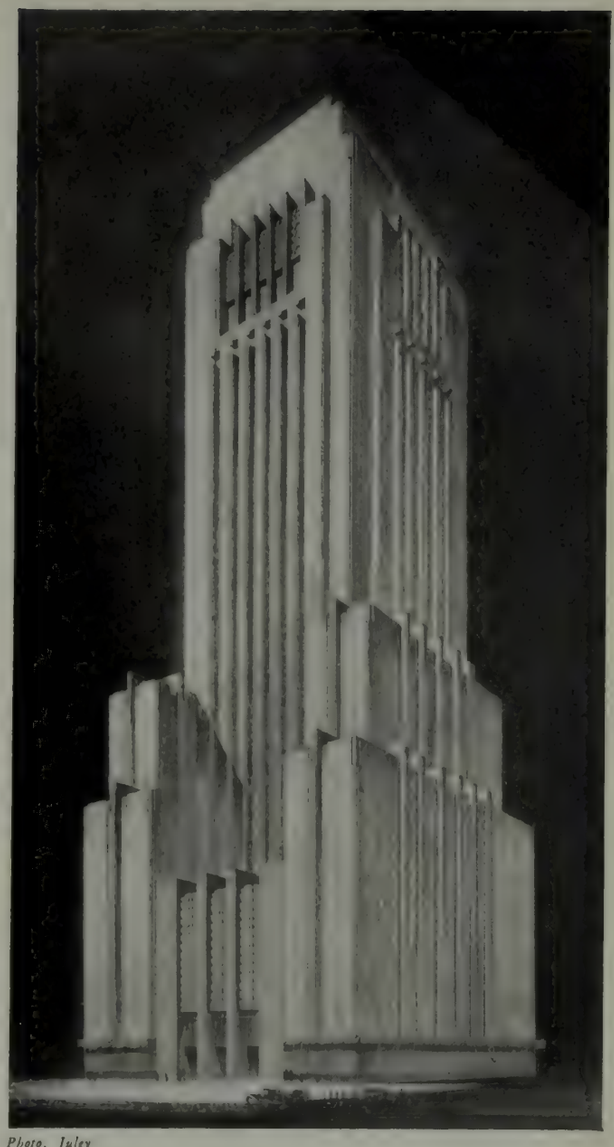
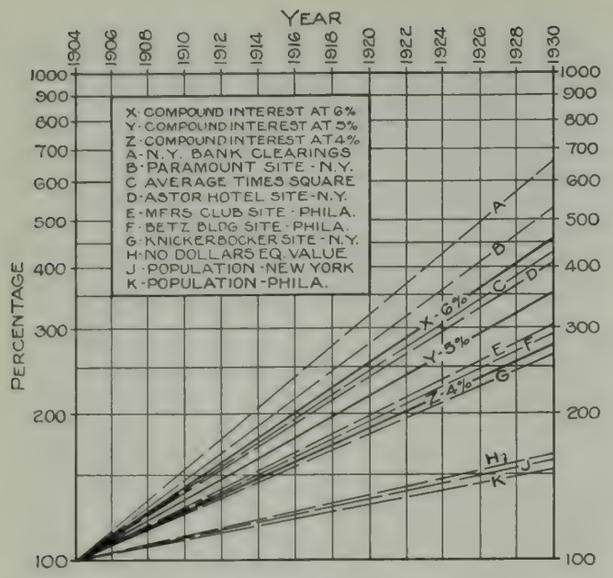


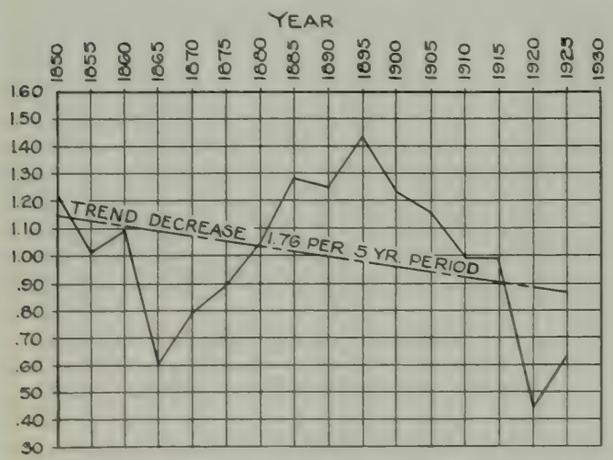
Photo. Juley

THE CLIFTON BUILDING, NEW YORK CITY
CYRUS W. THOMAS, ARCHITECT



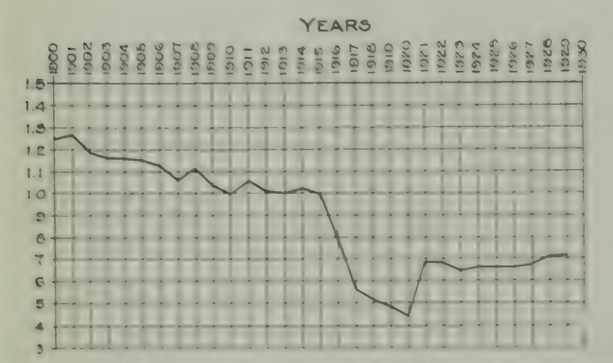
GRAPH 16. TREND OF INCREASE IN LAND VALUES

Taken at Times Square, New York City, and Broad Street, Philadelphia, and showing land values in comparison with the varying dollar value, compound interest at 4%, 5%, and 6%, with population increase in New York and Philadelphia, and with New York bank clearings



GRAPH 17. BUYING POWER OF THE DOLLAR

Based on wholesale prices in 1913 cents



GRAPH 18. BUYING POWER OF THE DOLLAR 1900 to 1929

Based on the 1913 dollar value. Some economists inform us that we are now entering a period of falling prices and of corresponding increases in the value of the dollar

Square district in New York have been taken, and represent a fair maximum in established Eastern cities. A graph has been prepared showing the increase in land values in this district since 1904. It shows that some sites have increased slightly more than others, but that the average is in the neighborhood of 400%. A comparison with the 5% compound interest line will show a close correlation.

A comparison with the line of equivalent dollar *value*, however (number of dollars necessary to equal the same actual value) indicates that of this 400% increase, a large part is illusory.

Central Philadelphia valuations have not increased quite so much. Typical examples indicate a fairly close parallel to the New York district.

There may be other districts, both in Philadelphia and New York, where land has decreased in value. Sometimes the owners themselves do not realize this since the dollar yardstick by which we measure values is unstable and has changed so greatly in purchasing power. Due allowance must be made for it over a period of time. For instance, land that has apparently doubled in value over the last 25 years has actually only remained static in actual worth, since the dollar is worth only half what it was 25 years ago. Thus a property which has shown an increase of 50% in number of dollars is actually worth less than it was.

In the study of any particular property, therefore, it becomes necessary to obtain data on the historical trend of increase or decrease in value for the site.

ECONOMICS OF THE LAND

CASE 1. OBSOLESCENCE FOR INCREASING LAND VALUE

Consider first a development on $150 land where the building has been designed in a ratio of 1.4, or has a cost of $215 per square foot of land. Carrying charges, etc., bring the total project cost or capitalization to about $470 per square foot of plot.

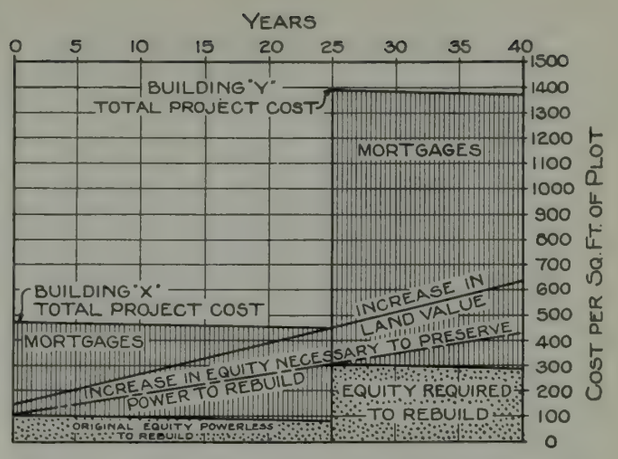
Let it be assumed that this land in twenty-five years increases to 300% of its initial value, an increase which is in line with many that have occurred in our typical cities.

At the end of this time, with land at $450 per square foot, the building is in inadequate relationship to land value; and due to increased taxes and operating expense, coupled with rentals well below those obtainable with new buildings on land of this value (due to the age of the building), the margin of profit is wiped out and an actual annual deficit develops. The building is probably in a fair state of preservation but its economic life is ended.

The owner's initial equity of 22% of the total project cost of $104 per square foot of plot is reduced to $84. The building costing about $215, plus $105 carrying charges is now valueless, resulting in a loss of $320 per square foot of plot. The increase in land value has almost offset this by its enhancement of $300 per square foot of plot, so that a loss of only $20 per square foot of plot has occurred.

However the status of the owner is not very favorable, since a project cost of about $1,398 per square foot of plot is required on the new land value of $450, to bring in a proper return. The equity balance of $84 per square foot of plot is only about 6% of the new project cost in place of the 22% needed. The deficiency in equity is thus about $224, which is more severe a requirement to make up than is the loss in equity of $20. To raise this sum in 25 years, compounded at 5% interest, would require a sinking fund of $4.47 per year or approximately 1.4% on the cost of the building with carrying charges totaling $320—the value on which the replacement is based.

Graph 19 illustrates the necessity of preserving the ability to rebuild on land increasing in value.



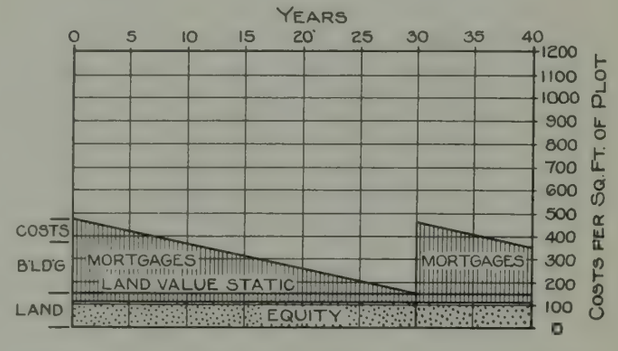
GRAPH 19. OBSOLESCENCE WITH INCREASING LAND VALUES
Showing necessity of sinking fund to preserve ability of owner to rebuild

CASE 2. STATIC LAND

In the case of static land value, the amount required to be set aside to preserve the owner's equity intact is merely equal to the building-and-carrying costs which have wasted away. This equity will suffice to rebuild as before, since the land value is unchanged and the same project cost required. The average life of a building under these conditions may well be taken at 30 years.

The original building and costs amounting to $320 per square foot of plot are therefore to be replaced in 30 years. This requires an annual sinking fund of $4.59, or 1.43% on the value wasted away.

Such a sum will both protect the owner's equity and enable him to rebuild since the requirements for both are the same in this case.



GRAPH 20. OBSOLESCENCE WITH LAND VALUE STATIC
Showing wasting away of building and carrying costs and sinking fund necessary to offset it

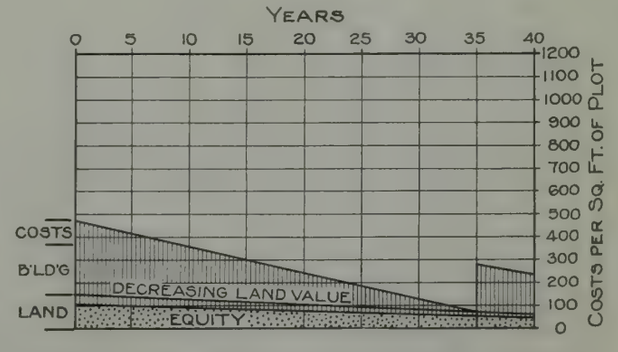
CASE 3. DECREASING LAND VALUE

On decreasing land not only must the cost of building and carrying charges be raised, but also the amount of decrease in the land value, which has also wasted away.

On the basis of the same initial costs, let us assume that the land has decreased 50% in value to $75 per square foot of plot in a 35-year period (which may reasonably be taken as the building life under these conditions). This decrease of $75 in value coupled with the building and other costs of $320, make a total of $395 which has wasted away. This sum must therefore be raised to preserve the equity value; it requires a sinking fund of about $4.17 which is approximately 1.3% on the original investment less the land value.

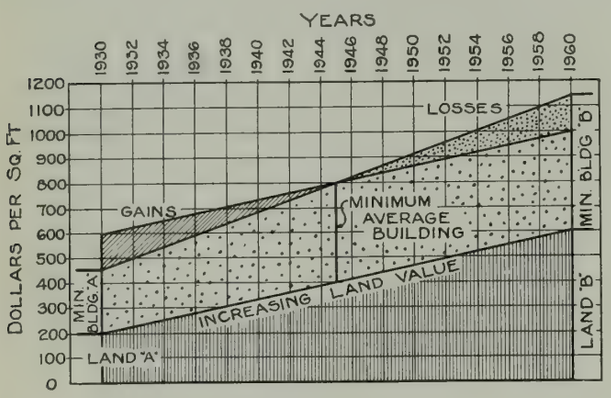
More severe cases have occurred than that indicated for rising land value. It is therefore believed that an allowance of 1½% per year based on building and carrying costs, or total investment less land value. should be allowed for obsolescence, regardless of whether land value is increasing, decreasing, or remaining static. This should be placed in a sinking fund accumulating at 5% or more.

Note that buildings in *uneconomic ratio* to their land value are subject to increased obsolescence from inadequacy, and therefore require greater sinking fund allowance than correctly proportioned buildings, due to their shorter span of useful life.

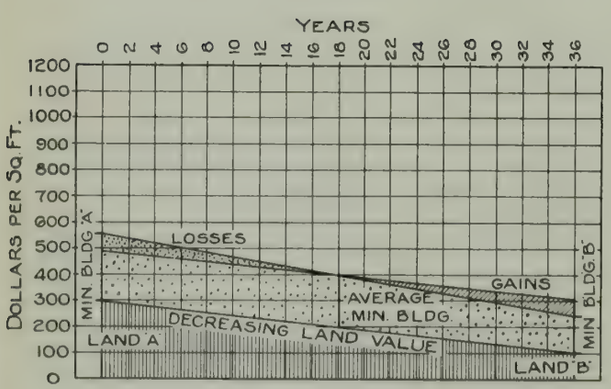


GRAPH 21. OBSOLESCENCE WITH DECREASING LAND VALUE
Sinking fund to cover building and costs and loss in land value

*The Effect of Obsolescence on the Useful Life of Office Buildings, by Earle Shultz (National Association of Building Owners and Managers, Chicago).



GRAPH 22. THE MINIMUM AVERAGE BUILDING, BASED ON INCREASING LAND VALUE
Note that the effect of compound interest is such that the gains in the first period need not be as large as they would have to be without the factor of interest, to cover the losses in the latter part of the building's life



GRAPH 23. THE MINIMUM AVERAGE BUILDING, BASED ON DECREASING LAND VALUE
Losses during the first period must not be too large because at the end of the building's life compound interest should have been earned as of its entire life

RENTAL RATES DECLINE WITH OBSOLESCENCE

A study of a number of buildings shows that the new building may obtain the maximum to be expected from the land value; thereupon, for the first period of its life, rents may increase almost in proportion to the increase in the land; during the second period they fail more and more to keep pace, and in the end may actually have to be reduced to hold the tenants.*

On decreasing land values rents decrease, with obsolescence, more rapidly than the land. Here vacancy problems as well as change of use must be included in the study.

The complete study for the life of a building, based on that of its neighbors, must be counted in estimating for this final decline.

BUILDING CYCLES OVER A PERIOD OF TIME

On any site, over a long period of time, the land value appears to follow a cycle. First it may have increased, then remained static, then decreased. This cycle has not affected all properties, but can be seen in full in certain sections of the city, and may be expected anywhere. (The shrinking dollar may mean that many properties apparently static, or slightly on the increase, are really on the decline.)

This shift of value may call for different *types* of buildings at its various stages, to satisfy the potential earnings: e. g., first a dwelling, then an apartment or store, then a larger apartment, store, or office building, and then—with the decreasing value—perhaps a loft structure.

To secure a reasonable return on a site, it is well to prevision the entire *series* of buildings on it.

THE MINIMUM BUILDING FOR THE AVERAGE FUTURE INCOME

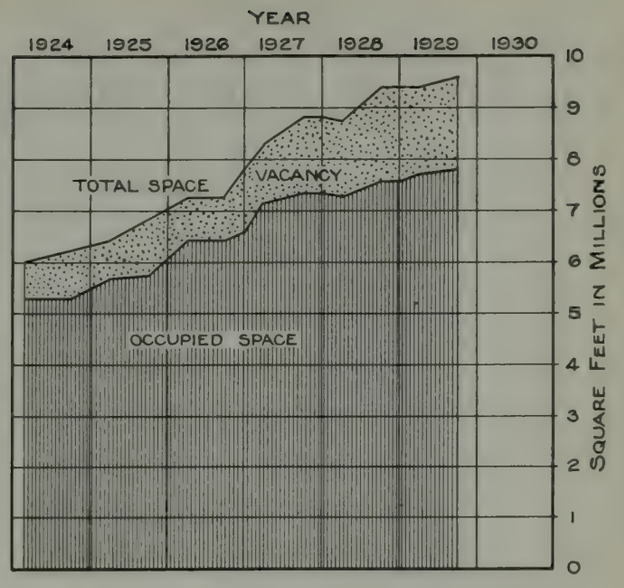
In the face of probable changes in land value, taxes, and other costs, it becomes necessary to relate the minimum building as calculated for the present to that for the normal period of future life.

This building must be so proportioned as to afford the maximum gains by incurring the minimum losses. An *average* minimum building can thus be deduced.

Graph 22 shows such a building for rising land values, and Graph 23 one for falling land values. In each case the building has been designed to meet the *average* condition. In the first instance the building begins by being *larger* than the minimum required, thus making sufficient gains at the start to offset the losses in the end when it shall be *smaller* than the now enhanced land value requires. In the second instance this condition is reversed, and an initial loss is offset by a final gain.

More exactly stated, in the determination of the "average building" present gains *plus compound interest* must balance future losses, if land value is rising; and present losses must be balanced by future gains *discounted* in the case of falling land value.

Demand is of course the ultimate key to the situation. The accompanying Graph 24, of the absorption rate of space in a typical city, has been compiled from accurate statistics taken over a period of years. Curves similar to this should be prepared for each district and class of building as a guide to probable future demand.



GRAPH 24. OFFICE ABSORPTION AND VACANCY IN A TYPICAL LARGE CITY
Curves similar to this should be prepared for each district and class of building. Demand is the key to the entire situation

STRUCTURAL ALUMINUM

The Aluminum Company of America has completed a new mill at Massena, New York, which can produce rolled structural members up to 14″ in section. While it is not anticipated that aluminum will replace structural steel for general building purposes, there are some buildings in which it may be used to advantage on account of its lightness and also because it needs no paint.

For purposes of preliminary analysis of a problem the architect may use the following generalizations:— Aluminum structural shapes weigh about ⅓ as much as steel of same section. An aluminum beam has about 2.32 times the strength of a steel beam of the same weight. Aluminum costs about six or seven times as much per ton as steel. Reducing these factors to the common denominator of cost we have: 6 (the cost per lb. compared to steel) ÷ 2.32 (strength compared to steel) = 2.6 times as great a cost as a steel beam of equal strength. This may or may not be offset by reduction in dead weight of a building or truss of long span. A New York architectural firm has recently estimated that for a certain building, with long spans and pile foundations, it would be more economical to use aluminum.

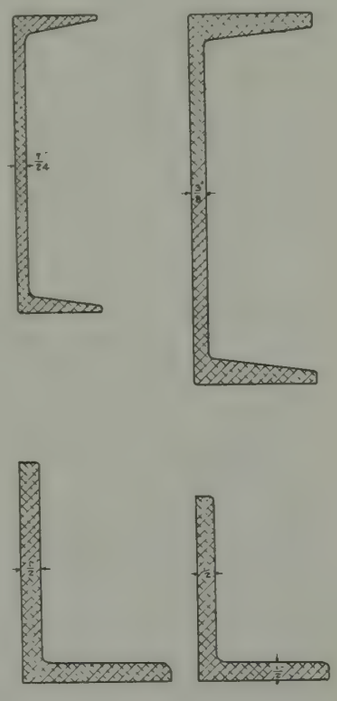
The accompanying table of "Design Stresses for Aluminum Alloys" will enable the architect to determine whether it is suitable for special uses.

DESIGN STRESSES FOR ALUMINUM ALLOYS
Values below are considered safe for ordinary structural design

	Alloy and Temper	Tension Lb./Sq. In.	Compression† Lb./Sq. In.	Bearing Lb./Sq. In.	Shear Lb./Sq. In.	Fatigue Lb./Sq. In.	Price Per Lb.
Wrought	3S0	4000	4000	4000	3000	5600	38c/43c
	3S½H	6000	6000	7000	3500	7600	38c/43c
	3SH	8000	8000	10000	4000	8400	38c/43c
	17ST	15000	15000	19000	9000	12000	40c/50c
	25SW	12000	12000	16000	7500	11600	38c/48c
	25ST	15000	15000	19000	9000	12000	38c 48c
	51SW	9000	9000	11000	6000	8400	36c 46c
	51ST	14000	14000	16000	7500	8400	36c 46c
Cast	12	5000	9000	9000	5000	6800	
	43	5000	6000	6000	4000	5200	
	195-4	7000*	11000	14000	7000	4800	

*Value given is for unaged casting. Where casting is to be aged for 3 to 6 months before use, a design stress of 9000 lb. per sq. in. is safe provided fatigue is not an important item.
†Short stiff members.

The principal building use at the present time for aluminum is in window spandrel and frame. Over 600,000 pounds of aluminum will be used for this purpose in the Empire State Building, New York City.



SOME STRUCTURAL ALUMINUM SHAPES

STRUCTURAL CLAY BY A NEW PROCESS

BY JOSEPH B. SHAW* AND MYRIL C. SHAW**

EDITORIAL NOTE: This article describes a radical innovation in the handling of clay which promises to make vitrified clay products easily available for many structural purposes.

All known clay products have been produced by methods in one respect similar: the clay was shaped first and annealed afterwards. The new process will shape the clay by pressure *while it is being vitrified*, much as steel or glass is rolled or pressed while hot.

In addition to securing new properties in the product, the new process can be used with clays or shales not available for the older processes.

The article in full, of which this is a part, will be found in the Journal of the American Ceramic Society, for March 1, 1930, by the kind permission of which we publish the section most important to architects.

In the process here described the clay is not brought to a state of fluidity such that articles may be formed from it by pouring or casting. The desirable condition for shaping the article is that of a plastic solid. All clays pass through varying degrees of fluidity during the vitrification process. The forces of surface tension and capillary attraction actually produce flow within the body of the clay during vitrification. If, at any time when clay is within this range of temperature, external pressure is applied, the clay particles will slip over one another and a dense product will be obtained. Kiln-marked brick, and deformation of fire brick in the load test, give evidence of this fact. If the temperature at which pressure is applied is low in the vitrification range, a high pressure will be required but a strong product obtained. If the temperature be somewhat higher, within the range of overfiring, a relatively small pressure will produce the desired result. If *a dense, strong product* is desired, (such as paving or structural material), the final shaping should take place before *vesicular structure* has developed to any marked extent. If a *light weight* block is desired, vesicular structure should be permitted to develop at a temperature relatively high in the vitrification range and pressure limited to that sufficient to give proper shape.

In carrying out this process the equipment and processes of the steel industry replace in large measure those of the present day ceramic plant. The product receives its ultimate shape by pressing or rolling.

If strong and dense products are desired, it is essential in the case of most clays and shales that oxidation be complete. It has been found that thin slabs, 1 inch to 2 inches thick, will oxidize rapidly and when subjected to the forming pressure the joint between such slabs is eliminated. It has also been found that a surface from a light burning clay can be pressed into a red burning central slab and give a veneered block of good strength and desired color. It is possible therefore by dry-pressing thin sections of the desired article to heat them through the dehydration and oxidation periods rapidly, in a period of a few hours as compared with days that would be required for articles of great thickness under present methods of manufacture, and at the proper temperature press the thin sections into a massive homogeneous block. It has also been found possible to reinforce these blocks effectively by inserting reinforcing steel between the sections and pressing it.

It is expected this process will be used in the production of paving slabs, massive structural materials, and heavy refractory blocks. It seems likely that vitrified clay products made under this process will be used in many cases where concrete is now used. Sea walls, piling, heavy beams, foundations, building walls, and similar articles, which are of large dimensions, and which can not be economically manufactured under the present practice, are the type of articles for the production of which this process seems ideal.

*Head, Department of Ceramics, Pennsylvania State College.
**Graduate Student in Ceramics, Pennsylvania State College.

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MAYA CIVILIZATION

Tulane University Expedition, 1925. Tribes and Temples. 2 vols. Tulane University of Louisiana, 1927.

Our knowledge of the developmental stages of the Maya civilization has up to the present time remained seriously incomplete, partly owing to the fact that the geographic area in which the history of the Mayas unfolded has been imperfectly explored. There are a number of "critical areas" into which it is believed the Mayas penetrated in considerable numbers, and which have not yet been adequately examined. One of these is the southern half of British Honduras; another, the south-western part of the state of Chiapas; still another—and in some respects, the most important—lies in the southern part of the state of Vera Cruz.

Did the Mayas come down off the plateau into the region of the Pánuco River, in remote times, and then emigrate south-eastwards to Chiapas, Tabasco and Guatemala, leaving the Huasteca remnant behind them? Or did the migration take place in the other direction, and do the Huastecas thus represent the advance guard of, or perhaps stragglers from, the northward moving tribes? The answer must certainly be sought in the region now lying between the Huasteca territory and the territory of the Mayas of Chiapas and Tabasco.

In "Tribes and Temples" we have the record of Tulane University's first expedition, under the leadership of Frans Blom, sent out to make a preliminary examination of three of the "critical areas"—Southern Vera Cruz, the Tabasco region, and central Chiapas. The expedition did not chance to find anything very new or very important in the Vera Cruz region.

In the Tabasco region, a number of significant finds were made. At La Venta, on the Blasillo River, some very fine sculptured figures were encountered, all evidently strongly influenced by early Mayan technical methods. At Comalcalco, a Maya city that had previously been partially studied by Charney, a most extraordinary burial chamber was discovered. It was probably the tomb of a king, and on its walls were some of the finest stucco bas reliefs ever found. The figures bear every evidence of being portraits—and good ones. Blom says in the report: "In this small chamber we stand before the best stucco work yet found in the Maya area. Even the fine stucco figures in Palenque do not reveal such mastery and freedom of line."

At Toniná, a ruined high-land city near the present town of Ocosingo, monuments carved in a highly distinctive artistic style were found. These monuments add weight to the theory, held by some, that the high-land Mayas early split off from the low-landers, and developed a more or less independent civilization.

A considerable portion of volume 2 is devoted to ethnological and linguistic studies. The former were most painstakingly done, and form a record of the tribal constitution and culture of the hitherto little-visited Maya tribes, whose history, if it could be recovered, would probably cause an entire revision of present theories in regard to development of the Maya civilization. The linguistic work is rendered less valuable than it might have been by two things: one—the most serious—is the fact that Mr. La Farge, who did the work, seems to know how to speak very little Maya. It is hard to believe that anyone who does not dominate its simpler spoken forms can do much toward analysing as difficult a language as Maya happens to be. The second handicap (at least, it is a handicap to the reader) is the phonetic alphabet used for recording the various dialects studied. This alphabet is far from clear; it has the grave defect of making use of four languages, besides Maya, for the representation of sounds—some letters are to be pronounced as in English, some as in French, some as in Spanish and one as in German. Since Mr. Blom is a Dane, that language might as well have been included, as a compliment to him. There is nothing more needed in the American linguistic field than an accurate and —what is vastly more important—a standardized phonetic alphabet. Before such a thing can be had, however, a careful and extensive study will have to be made, with recording instruments, of the phonetics of Maya and its dialects.

The report as a whole is open to some adverse criticism. The reader gets the impression that it was prepared by some one who did not exactly know how to go about it—did not know just what a scientific report ought to contain, and then did not know how the contents selected should be arranged. The book is too "popularly" written—which is a vice peculiar to American scientific books that can not be too severely condemned. Work of this sort must be presented with restraint and orderliness, and must be based on a carefully thought-out plan of presentation. The "travelogue" method employed does not add anything to its readability; and the touches of what must have been meant for "comic relief" introduced here and there mar the work considerably. This is more noticeable in the first volume. There is no reason why a report of this kind should be pedantic.

The substance of the book is excellent. In places, it is absorbingly interesting. More careful editing than was given to the first will make Tulane's second report, when it is published, a much better piece of work.

JAMES C. BARDIN

LIST OF NEW BOOKS ON ARCHITECTURE AND THE ALLIED ARTS

Bossert, Helmuth Theodor.

An encyclopaedia of colour decoration from the earliest times to the middle of the XIXth century, with explanatory text. London: V. Gollancz, Ltd., 1928. 34 p. illus., 120 col'd pl. f°. 52s 6d. 729

"The aim of this volume is to supply artists and craftsmen with a collection of coloured patterns showing what has been produced in decorative mural painting, or rather to show those noteworthy examples which have been preserved. The book does not pretend to be an illustrated history of mural painting. Attention has been called only to the purely ornamental element of wall painting."—Preface.

Cecchelli, Carlo.

Il Vaticano, la basilica, i palazzi, i giardini, la mura. Milano: Bestetti & Tumminelli, 1928. 105, 444 p. incl. plates. f°. 500 lire. 708.5

A large and elaborate volume on the Vatican and its art treasures, including some hitherto unpublished material.

Clouzot, Henri.

Papiers peints et tentures modernes (toiles et cretonnes imprimées). Paris: G. Massin, 1928. 6 p. 40 plates. f°. 150 fr. 745

A collection of modern French designs for wall papers and printed stuffs, using geometric, floral and landscape motives. Twenty of the plates are colored.

Gardner, Percy.

The principles of Christian art. New York: C. Scribner's Sons, 1928. 301 p. 8°. $3.50. 701

Bibliographical footnotes.

"I have tried to discover and set forth some of the general principles which underlie art, and especially the Christian art of Europe. The first part of the volume is psychological, the second part historical; and at the end I make a few tentative suggestions for a reconciliation between modern religion and art."—Preface.

Hall, Harry Reginald Holland.

The civilization of Greece in the Bronze Age. (The Rhind lectures, 1923). With 370 illustrations and 2 maps. London: Methuen & Co., 1928. xxxii, 302 p. front., illus., maps. 4°. 30s. 709.38

"The history of this remarkable ancient culture in outline and the salient characteristics of each successive period of its development, with the aid of pictures."—Introduction.

The author is Keeper of Egyptian and Assyrian antiquities in the British Museum.

Harte, Geoffrey Bret.

The Villas of Pliny; a study of the pastimes of a Roman gentleman; with drawings by Max Roeder. Boston: Houghton Mifflin Company, 1928. vi, 72 p. front., illus., 6 plates. sq. 4°. $7.50. 728.8

"Printed and made in England at the Shakespeare Head Press, Stratford-upon-Avon."

A vivid verbal picture, mainly from Pliny's letters, of the Roman villa of his period. The illustrations are from paintings and drawings. The photographs of sculpture from Pliny's Tuscan villa are in private possession and have never before been published.

Hermanin, Federico.

La Farnesina; presentazione di Arduino Colasanti: prefazione del principe Ludovico Chigi-Albani. Bergamo: Istituto italiano d'arti grafiche, 1927. 102 p. 58 pl. (part col'd.). sq. f°. 300 lire. 728.3

History, architecture and mural decoration of this Roman palace of the Renaissance period.

Layton, Edwin J.

Thomas Chippendale, a review of his life and origin. London: J. Murray, 1928. xv, 61 p. 4°. 10 s. 6 d. 749

A re-examination of documents and other evidence relative to the life of Chippendale, continuing the research made by Constance Simon in her English Furniture Designers of the 18th century, 1904, and refuting the theory of Oliver Brackett in his Thomas Chippendale, published 1924.

Lukomski, Georgii Kreskent.

Mobilier et décoration des anciens palais impériaux russes (Musées du peuple), avec une préface de M. Louis Réau. Paris: G. van Oest, 1928. 45 p. 84 pl. f°. 250 fr. 740

An historical summary and description of Russian interior decoration and furniture of the period from 1740 to 1850 which relates it to its European prototypes, but emphasizes the originality of its adaptations. Excellent folio plates.

Mayer, August Liebmann.

Gotik in Spanien. Leipzig: Klinkhardt & Biermann, 1928. 299 p. illus. 4°. (Handbuecher der Kunstgeschichte. Bd. 3.) 35 marks. 723.561

Bibliographical footnotes.

A series of essays on various aspects and examples of Spanish Gothic, mainly architecture but including also sculpture, painting, metal work, illumination, etc.

Maybon, Albert.

Les temples du Japon. Architecture et sculpture. Paris: E. de Boccard, 1929. 94 p. plates. f°. 60 fr. 722.1

A historical résumé of religious movements in Japan precedes the formal study of temple architecture and sculpture.

Nichols, Rose Standish

Italian pleasure gardens; with nearly two hundred reproductions of photographs, drawings and plans. New York: Dodd, Mead & Company, 1928. xxii, 309 p. front., illus., plates. 8°. $10.00. 710

Bibliography, pp. 291–294.

A review of certain Italian gardens, either of special type or particular locality. A useful itinerary lists the gardens and gives their owners, opening days, source of permit to visit, and the like.

Porter, Arthur Kingsley.

Spanish Romanesque sculpture. Firenze: Pantheon, 1928. 2 v. plates. f°. 1200 fr. 734

American edition; Harcourt, Brace; price $63.00.

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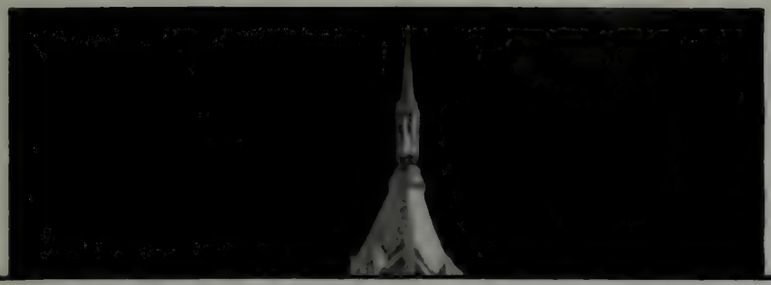
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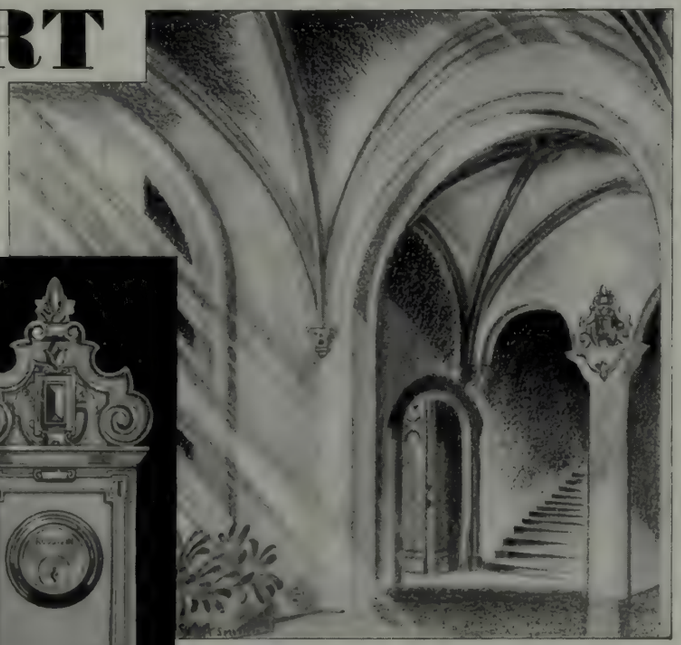
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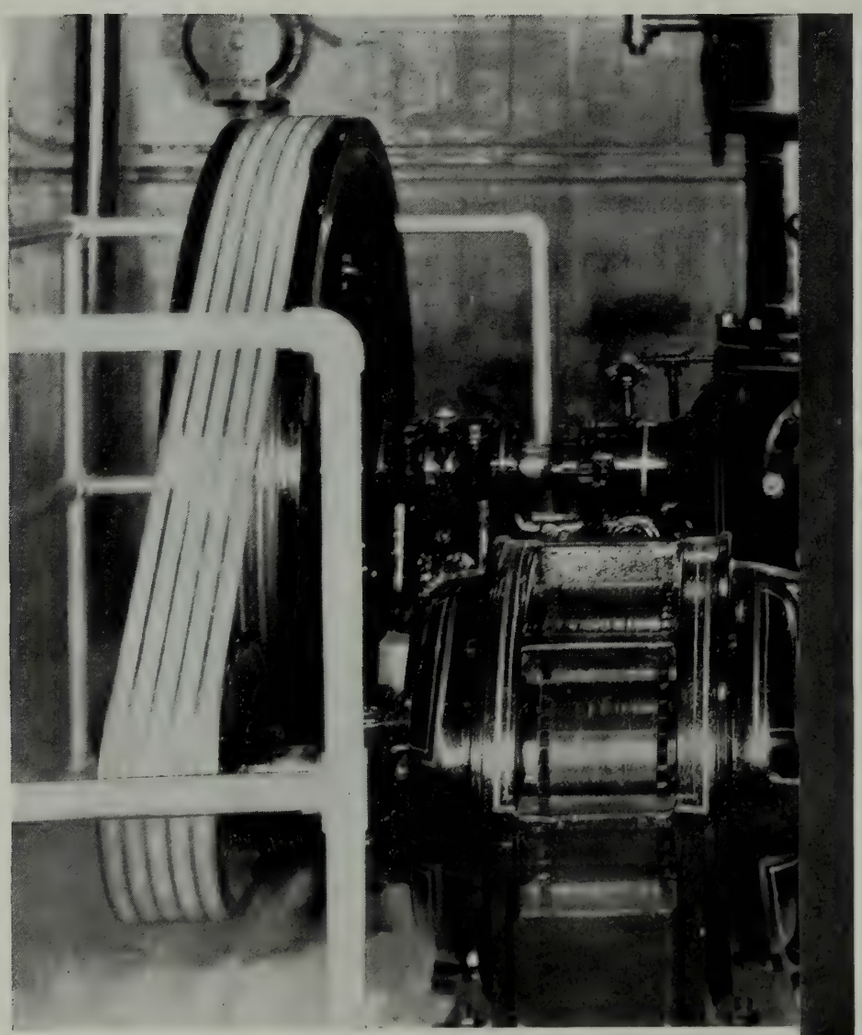
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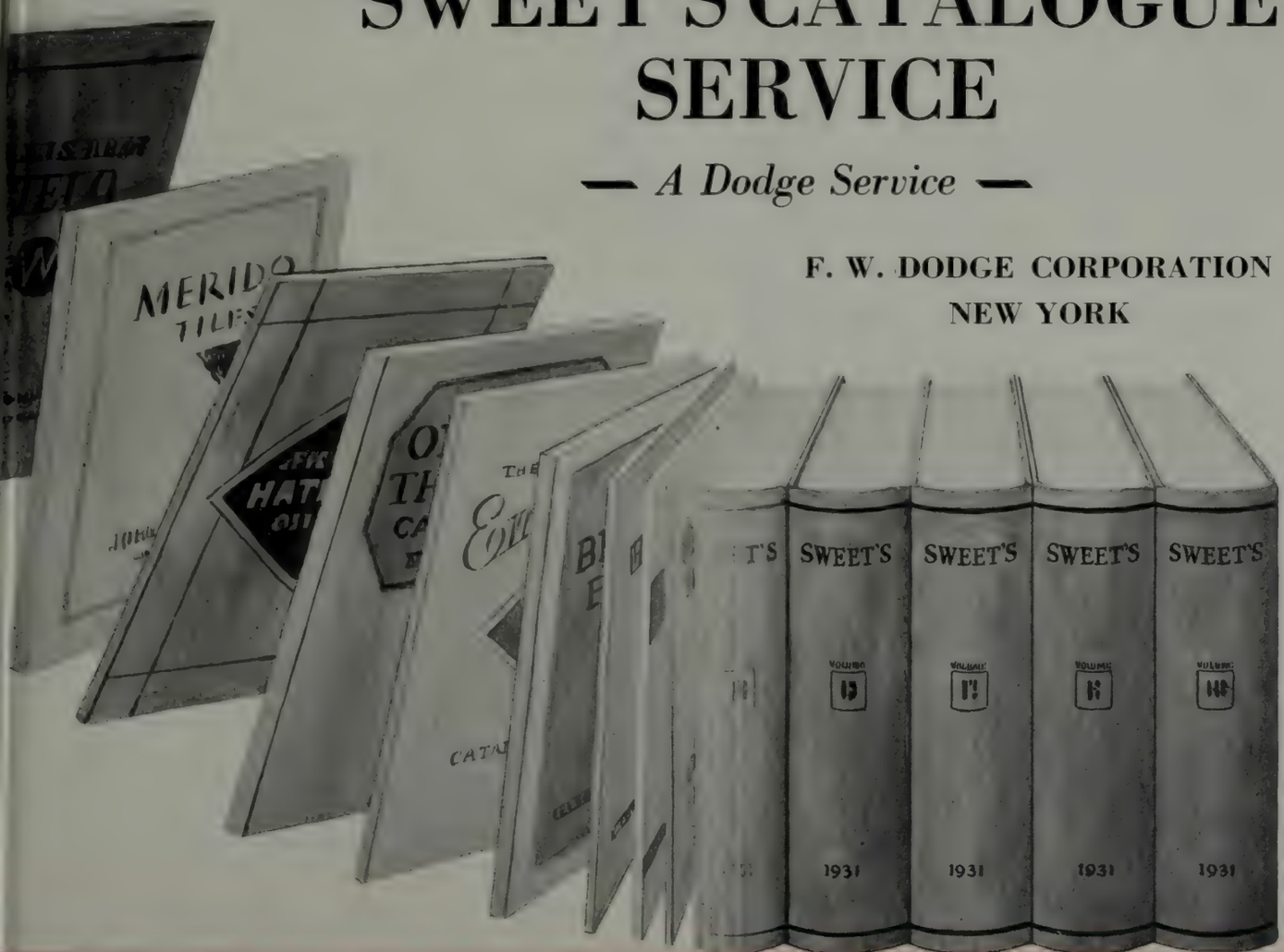
YOU have seen the large number of complete catalogues in Sweet's for 1930. There will be many more in the 1931 edition.

YOUR expressed preference for catalogues filed in Sweet's and the manufacturers' growing appreciation of the real economy and effectiveness of this form of catalogue distribution are bringing the Sweet's file constantly nearer perfection.

SWEET'S CATALOGUE SERVICE

— A Dodge Service —

F. W. DODGE CORPORATION
NEW YORK



MICHIGAN BELL TELEPHONE
Builds for Greater Future



Saginaw Division and Central Office



Detroit-Oregon Central Office

Detroit-Pingree Central Office



Detroit-Niagara Central Office



Port Huron Central Office

FORESIGHT is evident in the building program of the Michigan Bell Telephone Company. Future expansion is provided for in that the steel framework of their central offices is so designed that additional floors may be added later with a minimum of expense and alteration. The Detroit-Niagara and the Detroit-Pingree Offices are designed for five stories, the Detroit-Oregon and the Port Huron Offices for six stories, and the Saginaw Division and Central Office for thirteen stories. Steel for this latter building was fabricated by the American Bridge Company and erected by the Detroit Steel Construction Company. R. C. Mahon Company fabricated and erected the steel for the Detroit-Oregon Office—Whitehead & Kales Company for the remaining three. Smith, Hinchman & Grylls were the Architects and Engineers in each case.

Foresight was not confined to the design of these buildings, but was further evidenced in the selection of Carnegie Beams to form the steel framework. With their wide parallel flanges and their mathematically graduated range of sizes and weights, Carnegie Beams have contributed to steel construction a splendid efficiency and a new simplicity of fabrication. Their conspicuous success indicates their remarkable adaptability to the needs of architects and designers.

CARNEGIE STEEL COMPANY - PITTSBURGH, PA.

Subsidiary of United States Steel Corporation 63

CARNEGIE BEAMS

IN PHILADELPHIA

•COLOR MEANS KOHLER . . . AND MAKES SALES



Development at Cottman and Walker Streets, Philadelphia. Equipped with Kohler tubs, lavatories, closet combinations and kitchen sinks in Spring Green. . . . Builders, Fishman & Park. Plumbing jobbers, American Tin & Terne Plate Co. Plumbing contractor, Herbert A. Klosterman.

Development at Yeadon, Delaware County, Pa. Equipped with Kohler tubs, lavatories and closet combinations in Old Ivory. . . . Builders, Holden & Sklar. Plumbing jobbers, Fisher Bros. Plumbing contractor, Anthony P. Weick.

From the builder's point of view, the first reason for using Kohler fixtures in color is their power to interest, suit and sell prospective tenants and buyers.

Even in modest homes like those shown here, Kohler quality and craftsmanship prove a profitable investment, providing truer beauty and higher efficiency at no greater cost. The reactions of these two Philadelphia builders are interesting—

"We want you to know how well pleased we are with the colored plumbing fixtures installed in our new operation. The green kitchen sink with your new Duostrainer is a wonderful feature, and the bathroom fixtures are beautiful.

"These colored fixtures have been the source of much favorable comment from the buyers of new homes, and have aided in selling out this operation more than any other single feature of the job."—Fishman & Park.

"During the past year we have used colored enamelware and vitreous china fixtures exclusively in our bathrooms. These have been accepted with the greatest enthusiasm by an exacting public. We have featured the charm of colored fixtures in our advertising. The mellow beauty of Kohler colorware is especially pleasing."—Holden & Sklar.

Manufacture at one central point under one rigid criterion of merit makes Kohler quality and Kohler colors always uniform. Kohler colors are soft, true, pleasing. The enameled ware harmonizes with the vitreous china in tone and shade. An added advantage in all-Kohler installations is the fact that the fittings can be ordered with the fixtures. This assures efficient operation and often saves considerable expense, as the complete order comes in one lot. Kohler fixtures deserve Kohler fittings. . . . Kohler Co. *Founded* 1873. Kohler, Wis.—*Shipping Point*, Sheboygan, Wis.—*Branches in principal cities.* Look for the Kohler trade-mark on each fixture.



Columbia Square Pedestal Lavatory K-205-F, with combination compression supply and lift drain fitting—used in both developments shown.

KOHLER OF •KOHLER

PLUMBING FIXTURES

BROADWAY

NATIONAL BANK & TRUST COMPANY

DISPLAYS MONEL METAL'S WHITE BEAUTY



THERE'S no better place than Fifth Avenue, New York, to watch the trend of popular favor—in fashions, in automobiles or in architectural decoration. On Fifth Avenue are situated some of the most impressive bank and office buildings American architecture has created. You may look to Fifth Avenue for inspiring suggestions for modern metal decoration.

On the entrance to the Broadway National Bank & Trust Company, at the corner of 29th Street, you will see etched Monel Metal panels inserted in bronze doors. You will see a Monel Metal clock dial. Inside the bank, you will find combinations of Monel Metal and bronze employed for counter screens, check desks, grilles and other trim.

With the present vogue for ornamental white metals, Monel Metal comes into its own. Its silvery beauty is permanent. It resists the attacks of age and corrosion. It can be kept bright and shining with very little care. It retains its original attractiveness for years and years.

In designing ornamental work which must be executed in white metal, specify a material that will perpetuate your design. Specify Monel Metal.

Monel Metal and bronze entrance of the Broadway National Bank & Trust Co., Fifth Ave. & 29th Street, New York. Metal work executed by SUPERB BRONZE AND IRON CO. of Brooklyn, N. Y. Etched Monel Metal panels by ETCHED PRODUCTS CORP., Long Island City, N. Y. Architect: LOUIS H. FRIEDLAND, New York.

Monel Metal is a technically controlled Nickel-Copper alloy of high Nickel content. It is mined, smelted, refined, rolled and marketed solely by The International Nickel Company. The name "Monel Metal" is a registered trade mark.

INCO MONEL METAL

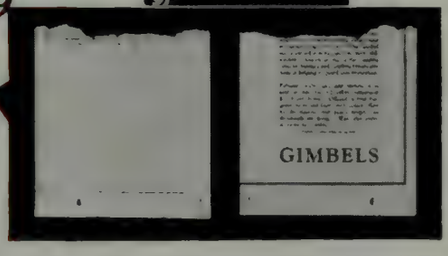
HAVE YOU RECEIVED THE MONEL METAL ARCHITECTURAL FOLDERS?

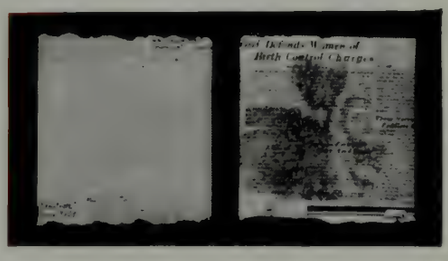
MONEL METAL

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.



2 Coats— Six Hours —*and a first-class job*





Velumina Wallhide holds itself out—is not absorbed by surfaces or substances as porous as even newspaper. Top illustration shows how Velumina Wallhide "holds itself out" and does not stain through even porous newspaper, bottom picture how ordinary undercoater stains through newspaper.

FIRST a coat of the great SPOT STOPPER—Velumina Wallhide First Coater, the remarkable new product that "holds itself out" on plaster — old — new — no matter how porous. It stops moisture, lime, alkali and absorption troubles more effectively than any other undercoat material!

— And then, in six hours, it's ready for a coat of Velumina Wallhide Finishing which seals and surfaces any skips of first coater, covers up pits where knobs of plaster have been knocked off — then delivers smooth, uniform soft tones free from distressing glare or lustre.

Used under any flat wall paint, Velumina Wallhide First Coater revolutionizes painting on plaster. Never before such a time saver and trouble proofer. But the Velumina Wallhide System of both First and Finishing Coaters is double-proof against trouble!

Write for Booklet on Velumina Wallhide — the Great SPOT STOPPER.

Velumina Wallhide

First Coater and Finishing Flat

PITTSBURGH PLATE GLASS CO.

Paint, Varnish and Lacquer Factories, Milwaukee, Wis. Newark, N. J., Portland, Ore., Los Angeles, Cal.

PITTSBURGH Proof Products
Glass
Paint-Varnish
Lacquer-Brushes

An ingenious Robras 20-20 installation in a Montclair, N. J. home.



The hidden radiator, illustrated!

To illustrate a Robras 20-20 Radiator "in action", one would need to pry into all sorts of hidden places. Into walls between rooms (as above)! Into walls under windows! Under stairs! In short, wherever there is four inches of available space.

The surprising thing about Robras 20-20 Radiators is not just that they can be installed out of sight, out of the way: but that they can be installed *almost anywhere* out of sight, out of the way. The "art of concealing" is simplified—because no concealing is necessary. The radiator and all its attendant disguises simply vanish into the structure of the building.

May we tell you more about these sturdy, electrically welded brass radiators and their large fast-heating fin areas? Consult Sweet's Catalog, one of our offices or your A I A file. ROBRAS 20-20

ROME BRASS RADIATOR CORPORATION. ONE EAST FORTY-SECOND STREET, NEW YORK, N.Y.



OUR CONTRIBUTION TO THE ART OF HEATING AND VENTILATION

The Herman Nelson Wedge Core Radiator is an exclusive feature of all Herman Nelson Heating and Ventilating Products and accounts for their satisfactory performance.

THE HERMAN NELSON CORPORATION MOLINE ILLINOIS



© 1930
T.H.N. CORP.

BEHIND THAT GRILLE IN THE WALL

Write down your own ideas of a radiator in tune with the modern day . . . then see how perfectly the Herman Nelson Invisible Radiator meets them!

Invisible . . . this radiator fits within the wall . . . occupies no floor or room space . . . never mars the tasteful decorative plan . . . never interferes with the placement of furniture or draperies.

Easy to control . . . you simply turn a tiny knob at the grille, and heat is quickly distributed and diffused throughout the room—in the exact quantity desired.

Trouble-proof . . . once the Herman Nelson Invisible Radiator is installed, it never requires a moment's further attention. It has no joints of any kind to leak and fail—no parts that can rust or get out of order.

The radiator comes enclosed in a sturdy, scientifically designed steel case which may be installed in any standard wall or partition. For multi-story buildings, where access to control valves is required, a removable panel is provided

If you are planning a residence or any building that will have a steam, hot water, vapor or vacuum heating system, you will insure your client's satisfaction and the security of his investment by specifying Herman Nelson Invisible Radiators. A request will bring to you our catalog.

THE HERMAN NELSON CORPORATION,* Moline, Ill.

There's a radiator that says..."This home is modern"

HERMAN NELSON *Invisible* RADIATOR

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SAN FRANCISCO
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WINNIPEG, MAN.
CALGARY
LONDON
OSLO
MELBOURNE
TOKYO, OSAKA

*Makers of the *Herman Nelson Invisible Radiator*, for residences, apartments, hotels, offices and monumental structures • the *Unit-vent*, for the ventilation of schools, offices, churches and all buildings having an acute ventilating problem—the *Herman Nelson Jet Heater*, for economical distribution of heat in factories, mills, garages, warehouses, and smaller buildings.



Delano and Aldrich, *Architects*

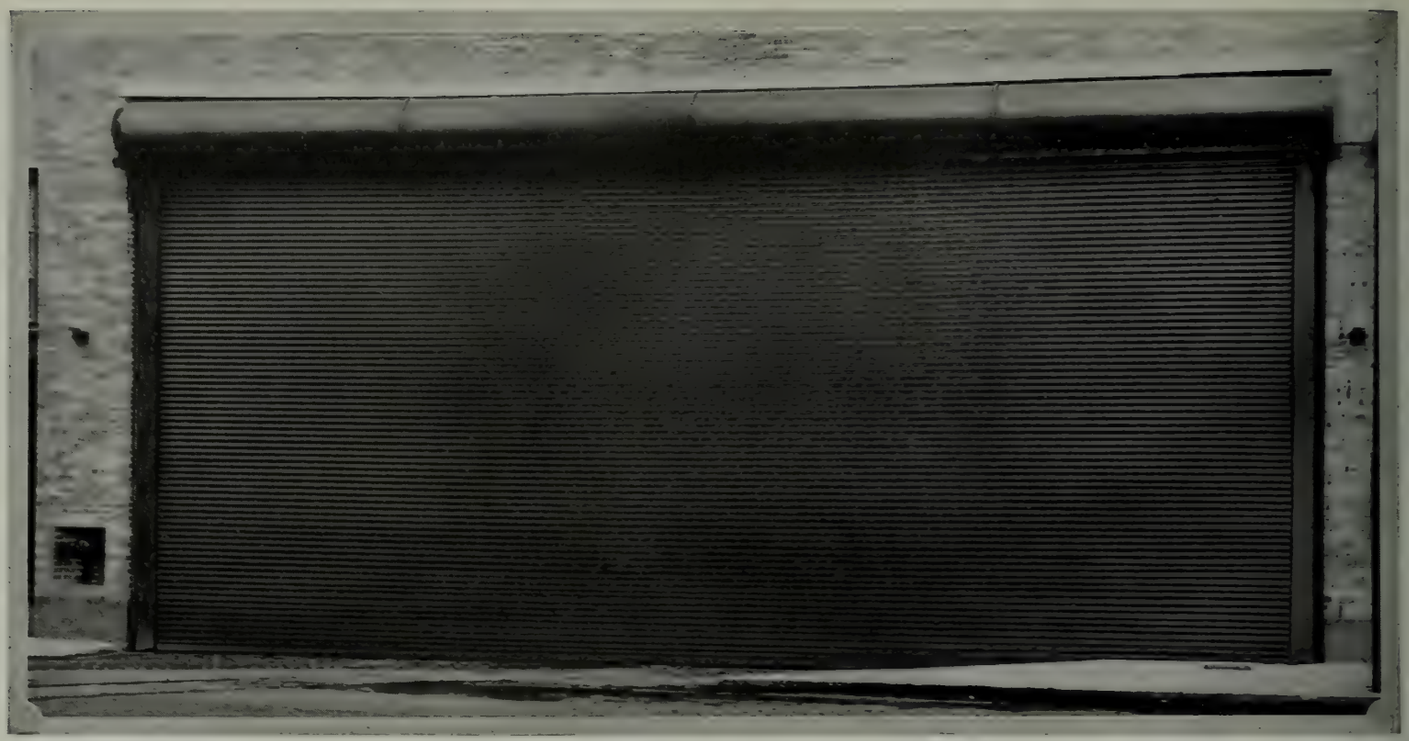
Variegated Vermont Slate in graduated thicknesses has been used successfully in designing the Tudor Stone Roof for this tennis court at Bayville, Long Island.

Rising·and·Nelson·Slate·Company

WEST PAWLET, VERMONT

Architects' Service Department: 101 Park Avenue, New York City

CHICAGO DETROIT PHILADELPHIA BOSTON



A typical Motor Operated Rolling Door, designed and fabricated by Kinnear.

There's No Door Problem Too Tough for KINNEAR Engineering!

A wide opening—railroad tracks—not an inch of space to waste—quick, easy operation absolutely essential regardless of the elements—uninterrupted service, day in, day out—month after month—year after year.

A tough problem? Yes—but not for KINNEAR. Designing rolling doors to meet unusual conditions is just part of the day's work. The leading architects, contractors and engineers of the country know this. That's why they have come to depend absolutely on Kinnear Specifications and Kinnear Rolling Doors. They know they are *right*.

They know that a Kinnear Rolling Door, while it may cost a trifle more at the start is by far the cheapest measured over a period of years. They know it will perform just as smoothly and efficiently after a life time of service, as the day it was installed.

Put your problems up to Rolling Door Headquarters and you won't go wrong. A third of a century's engineering experience is available without charge or obligation. New, illustrated catalog mailed free on request.

THE KINNEAR MANUFACTURING CO.

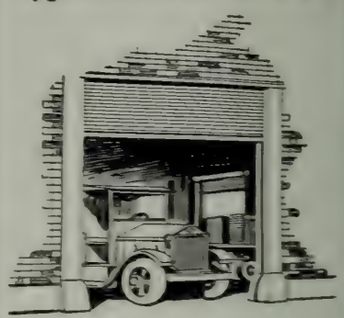
401-451 Field Avenue, Columbus, Ohio, U. S. A.

BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT NEW ORLEANS
NEW YORK PHILADELPHIA PITTSBURGH KANSAS CITY WASHINGTON

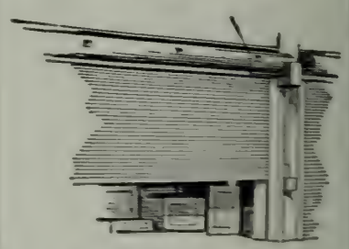
KINNEAR ROLLING DOORS

There *IS* No Equal

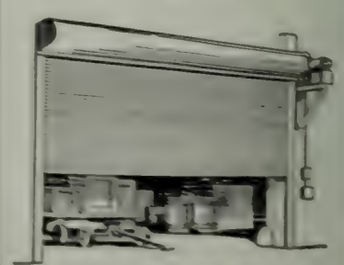
KINNEAR Makes Every Type of ROLLING DOOR



SERVICE DOORS



FIRE DOORS *and* FIRE SHUTTERS



MOTOR OPERATED DOORS



Levy Mayer Building *Wieboldt Hall* *Montgomery Ward Building*
Mc Kinlock Campus, Northwestern University, Chicago

James Gamble Rogers, N. Y.; Childs & Smith, Chicago, Associate Architects

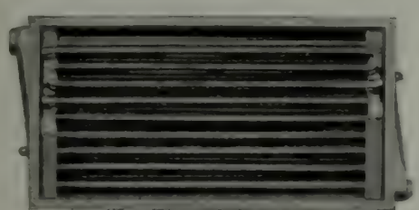
W. L. Fergus & Co., Chicago, Consulting Engineers

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American Blower Corporation, Fan System Apparatus

— *carte blanche*
only the best is good enough!



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4 Types **196 Standard Sizes**

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Enduro
makes today's beautiful structures practical



✖ The modern in architecture . . . sweeping straight lines and brilliant panels of flashing brightness . . . now becomes PRACTICAL thanks to Enduro Nirosta KA2.

✖ For Enduro keeps its sparkling silver brilliance indefinitely . . . without care. Enduro won't stain or rust. It is impervious to corrosion. The same, tough, hard metal THROUGHOUT, Enduro cannot chip off or wear thin.

✖ The new Chrysler Building with its gleaming spire is one of a number of modern structures for which Enduro has been specified.

✖ The modern trend is towards Enduro in building construction. Learn about this great Krupp-developed, American-produced alloy. Write for full information . . . there is no obligation involved.

CENTRAL ALLOY STEEL CORP.
Massillon {and Canton} Ohio
WORLD'S LARGEST AND MOST HIGHLY SPECIALIZED ALLOY STEEL PRODUCERS

ENDURO
NIROSTA
KA2 STEEL

A distinctive decorative achievement

...*the* Silver Grill

of the New Hotel Lexington



The Hotel Lexington, New York. Architects: Schultze & Weaver.



Silver Grill Room of new Hotel Lexington. Painted with Dutch Boy White Lead and Flatting Oil by Barker Painting Company, New York City.



DECORATED with DUTCH BOY WHITE LEAD *and* FLATTING OIL

DISTINCTIVE... different... beautiful! The Silver Grill of the new Hotel Lexington is an achievement in decorative art.

Dutch Boy white lead, mixed with flatting oil, was used not only in the decoration of the Silver Grill, but in all the bedrooms, and parlors of the hotel. The rich, artistic finish this flat paint produces, as well as its extreme durability and washability, explains the preference it enjoys in modern buildings everywhere.

Another advantage of white lead as a paint material is its great adaptability. White lead is used for mixing *every* type of paint—to obtain durable, economical paint for wood, plaster, wall board or metal... undercoatings for enamel... blended or mottled effects... and to produce the plastic paint that gives the new low-relief textures now so much in vogue for lobbies and entrances.

Let us send you booklet, "Decorative Possibilities of Paint", which describes the modern finishes Dutch Boy helps to produce. We shall also be glad to send you a book containing formulas for all coats and finishes. Address branch office nearest you.



The well-known brand of Carter White Lead is also made by the National Lead Company. In purchasing either Carter or Dutch Boy White Lead, the buyer is assured of obtaining white lead of the highest quality.



DUTCH BOY WHITE LEAD

"Save the surface and you save all"

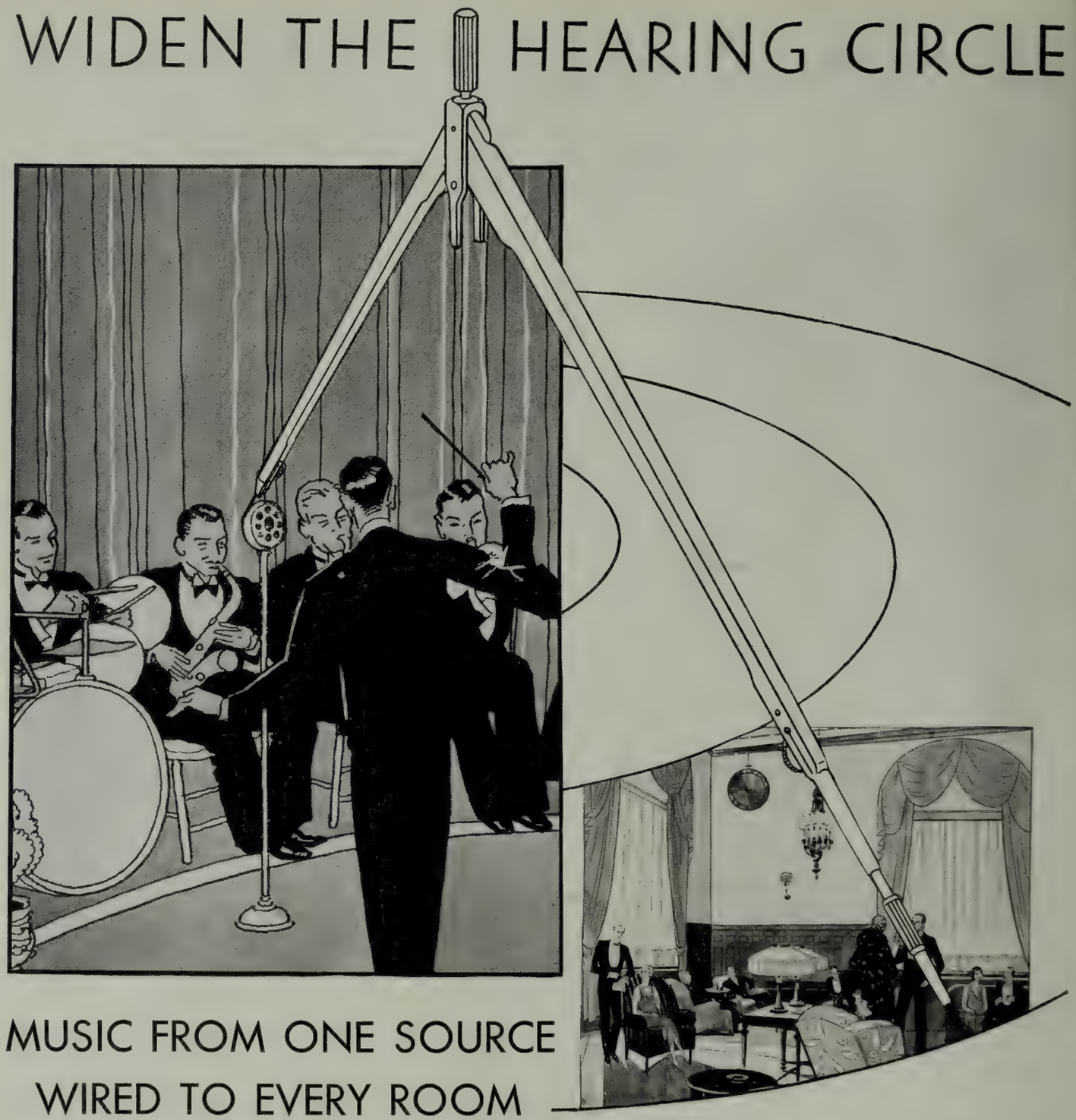
NATIONAL LEAD COMPANY

New York, 111 Broadway; Buffalo, 116 Oak St.; Chicago, 900 West 18th St.; Cincinnati, 659 Freeman Ave.; Cleveland, 820 West Superior Ave.; St. Louis, 722 Chestnut St. San Francisco, 235 Montgomery St.; Boston, National-Boston Lead Co., 800 Albany St.; Pittsburgh, National Lead & Oil Co. of Pennsylvania, 316 Fourth Ave.; Philadelphia, John T. Lewis & Bros. Co., Widener Building.



Typical parlor of suite in Hotel Lexington, painted with Dutch Boy White Lead and Flatting Oil.

WIDEN THE HEARING CIRCLE



MUSIC FROM ONE SOURCE WIRED TO EVERY ROOM

Plans for many buildings now include the equipment which "widens the hearing circle"—the Western Electric Public Address System. Hotels, clubs, schools, hospitals—all are finding many uses for this system which amplifies and distributes sound.

With this apparatus, hotels are bringing music to public rooms and guest rooms alike via loud speaker. Clubs are providing dance music for members. Schools are holding music appreciation courses. Hospitals are shortening weary hours for their convalescents.

The equipment is made by the makers of the nation's telephones. For further data consult Sweet's Catalog, pages D5441-5444. Or write the Graybar Electric Company, Graybar Building, New York. Offices in 73 principal cities.

Western Electric

PUBLIC ADDRESS AND MUSIC REPRODUCTION SYSTEMS

Distributed by GRAYBAR *Electric Company*



KNIGHT-WARE Drain Lines in Columbia Presbyterian Hospital Centre



Figure 235
Acid Proof Laboratory Sink
with Back

We manufacture any and all designs of Acid Proof Laboratory Sinks, Acid Sumps and Catch Basins, Ventilating Flue Caps and any acid proof equipment for the building.

This equipment can be made to your exact specifications or we will gladly make such suggestions as will best suit your needs.

Safe from Attack by Corrosives

KNIGHT-WARE Acid Proof Chemical Stoneware Waste, Drain and Ventilating Lines installed into your building is permanent insurance against attack by acids or corrosives so long as the building shall stand.

Further, KNIGHT-WARE is not expensive; in fact costs less than many other so-called acid resisting materials. It is easily and economically installed, only one hanger being required per length of pipe or fitting. Joints are readily made that are acid proof and will stand far in excess of any pressure they will ever be called upon to withstand.

Experience and knowledge derived from our many KNIGHT-WARE installations is yours for the asking. May we be of service?

MAURICE A. KNIGHT

OFFICE AND PLANT—AKRON, OHIO

GUARANTEED SATISFACTORY — MAURICE A. KNIGHT — ACID-PROOF CHEMICAL STONEWARE

KNIGHT-WARE

"IT IS THE BODY ITSELF"

The Sign of Quality In Acid Proof Chemical Stoneware

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Douglas 375

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Montreal, Que.
1307 Notre Dame Street, West
Main 2625

MOSAIC CERAMIC TILES *add character and permanence to floors*



Floor of Mosaic Granitex Ceramics

Color, tan . . . basket weave pattern

MOSAIC

The name "Mosaic" is stamped on all products of The Mosaic Tile Company, which include ceramic mosaics, vitreous, semi-vitreous, wall and faience tiles, as well as "ALL-TILE" bathroom accessories. The word "Mosaic" should be used in writing tile specifications.

UNLIMITED possibilities for distinctive floor treatments are offered by ceramic mosaics of The Mosaic Tile Company. Their soft, unglazed colors lead to fine decorative harmony. Vitreous and semi-vitreous, they far outlast substitute materials. Unique designs, modern designs, any designs you please, are worked out with them. Quickly installed, with minimum labor cost. We are glad to help with color sketches.

THE MOSAIC TILE CO., 604 Coopermill Rd., ZANESVILLE, OHIO

New York Chicago St. Louis Los Angeles San Francisco

THE DOORWAY OF AMERICA'S FREIGHT ELEVATOR TRAFFIC

DRUMS of liquids, heavy machinery, barrels, boxes, cartons and bottles... trucking wheels and human feet... indoor freightage of every type... from ponderous steel to delicate fabrics... pass daily through Peelle Doors.

For over a quarter of a century, Peelle Doors have leveled vertical shaftways to horizontal avenues for industry's traffic... its production parade from crude to finished product. Abreast of industry's program for lowering handling costs and plant distribution, Peelle Doors offer automatic operation. Electrified... affording instant exit or entrance at the touch of a button... they save more time, lessen labor, lower maintenance and manufacturing costs. Consult our engineers, or write for catalog.

THE PEELLE COMPANY, Brooklyn, N. Y.

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PEELLE
FREIGHT ELEVATOR
DOORS

The Secret of Super-Efficiency in Underground Conduit for Steam Pipes

"CLOSED CONSTRUCTION"

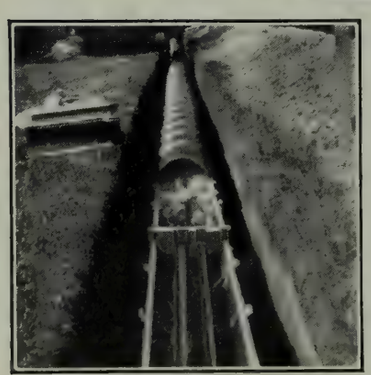


THIS Ric-wiL "Closed Construction", made possible by Dry-paC insulation, is showing efficiency results heretofore unobtained in underground steam lines. Recent tests of installations have shown efficiencies from 92% to 94%.

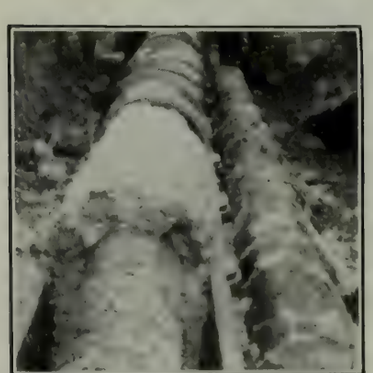
Closed construction eliminates all movement of air around the pipes and all threat of moisture—the two great causes of heat losses. It solves the problem of heat from lines leaking into basements.

Space around the pipes is filled with Dry-paC conduit filler which is both high in efficiency and absolutely water repellent. And this is then locked and sealed in the Ric-wiL tile or cast iron housing, with even the ends of the runs closed tight. Air and water are permanently excluded.

The result is a new super-efficiency that adds new saving and profit to any underground steam distribution line —with installed costs that are in line with ordinary construction.



A Ric-wiL closed construction job. Note shallow trench possible with Ric-wiL and special frame used in applying Dry-paC



Insulating steam pipe with Dry-paC in Ric-wiL Conduit. This material will not sag down from around pipe

Write for further information about Ric-wiL. Our Engineering Department will be glad to cooperate with you. Service Detail Sheets and samples of Dry-paC for testing will be sent on request

THE RIC-WIL COMPANY

1566 Union Trust Bldg., Cleveland, O.

New York Boston Baltimore Atlanta St. Louis Chicago

Originators of Waterproof Conduit Filler

RIC-WIL

UNDERGROUND CONDUIT



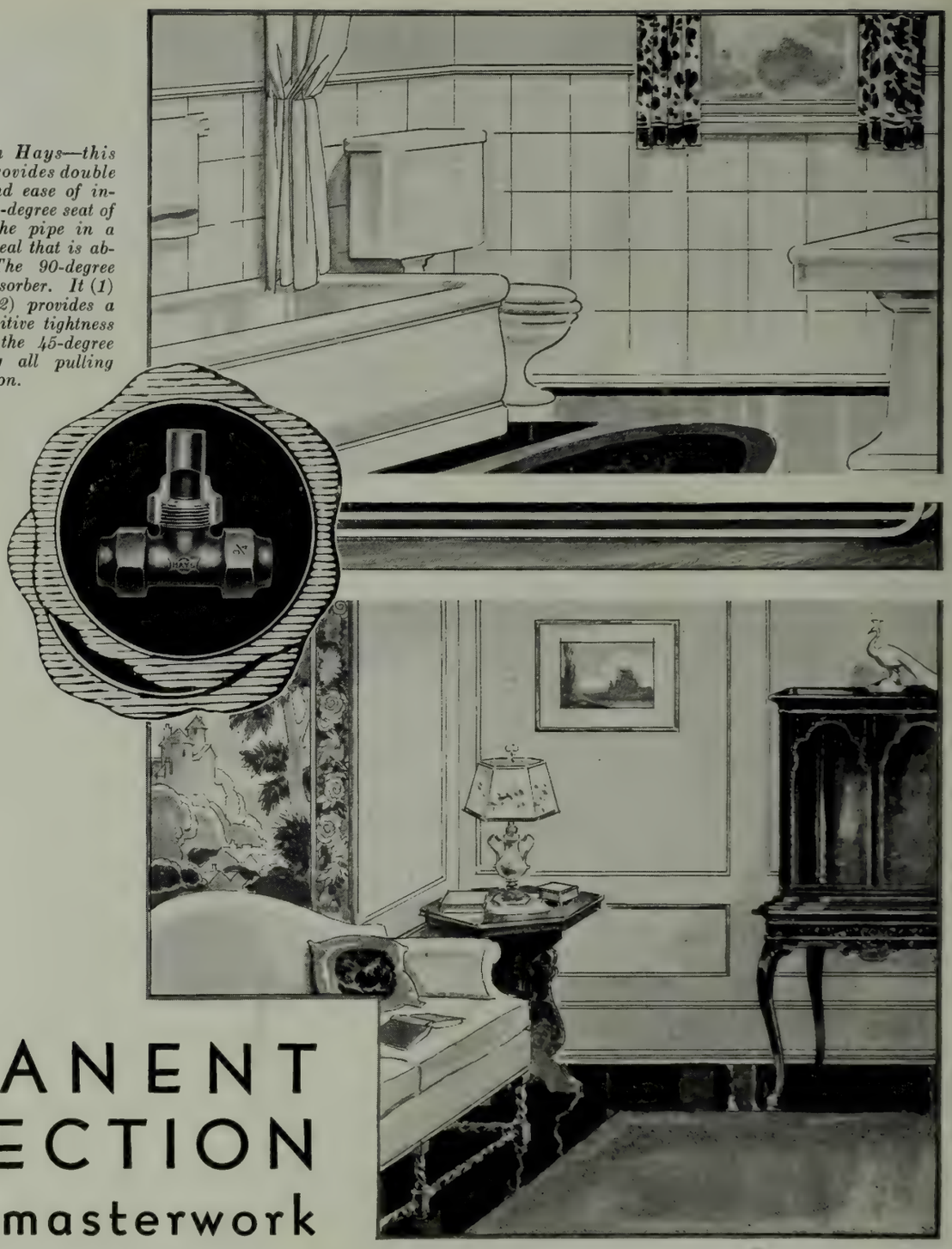
This pigeon-clustered tower ... one of the most picturesque sights on the estate of Leonard C. Hanna, Jr., Esquire, Mentor, Ohio ... is roofed with IMPERIAL Hand Made Shingle Tiles reproduced from 16th century tiles. Robert O. Derrick, Inc., were the architects.

LUDOWICI-CELADON COMPANY

Makers of IMPERIAL Roofing Tiles

NEW YORK: 565 FIFTH AVENUE — 104 S. MICHIGAN AVENUE, CHICAGO — WASHINGTON: 738 FIFTEENTH ST., N. W.

Exclusive with Hays—this double seal provides double strength, safety and ease of installation. The 45-degree seat of the fitting holds the pipe in a wedge, making a seal that is absolutely tight. The 90-degree seat is the shock absorber. It (1) locks the pipe. (2) provides a second seal of positive tightness and (3) protects the 45-degree seal by absorbing all pulling strains and vibration.



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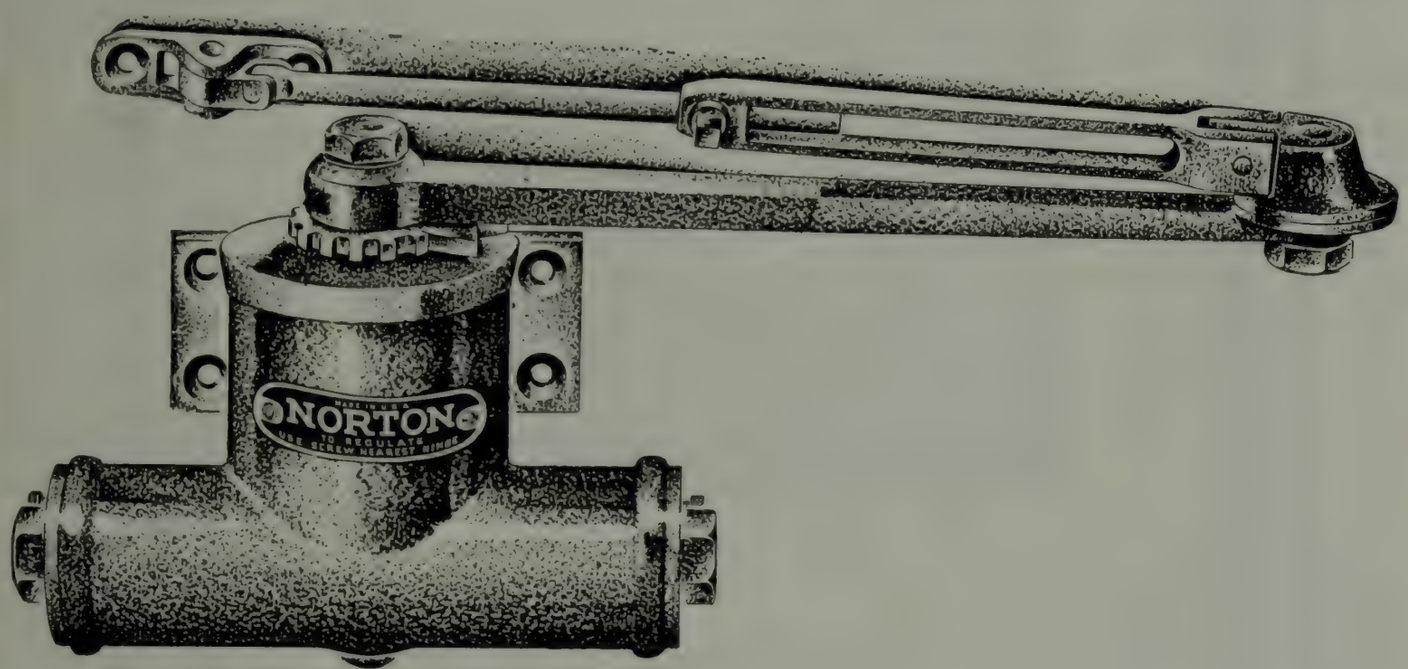
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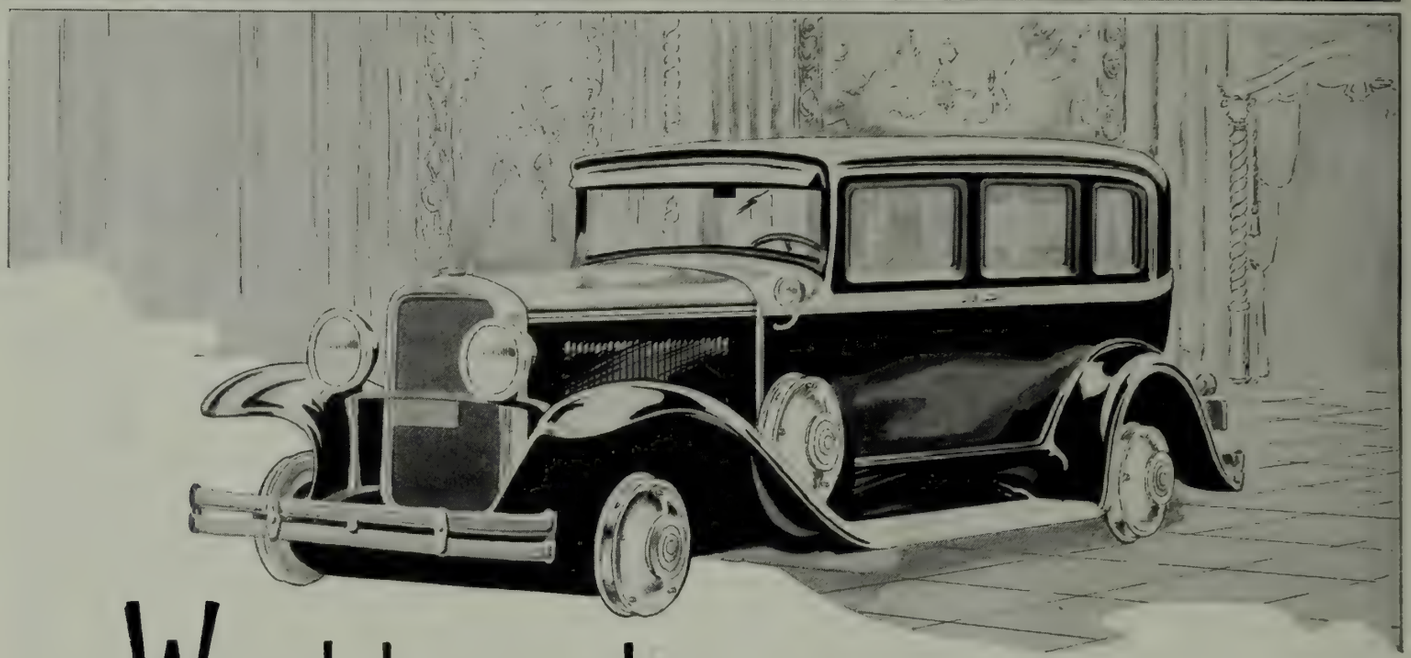
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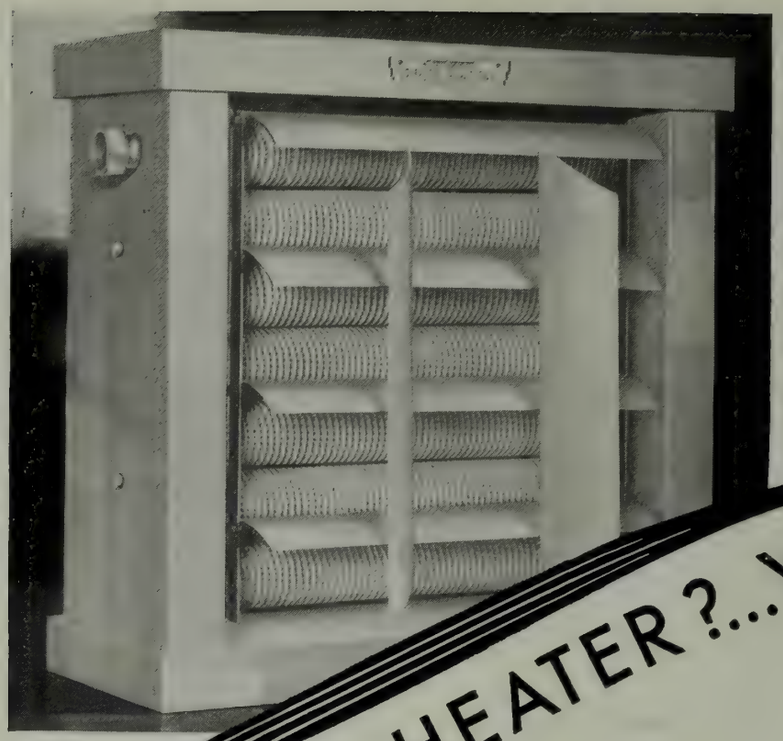


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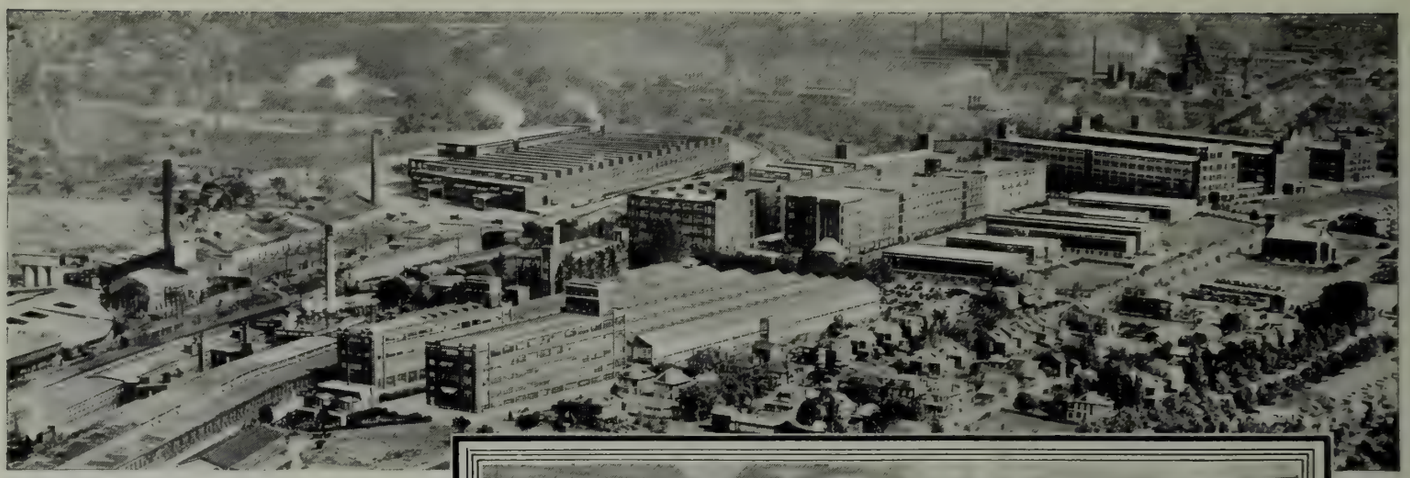
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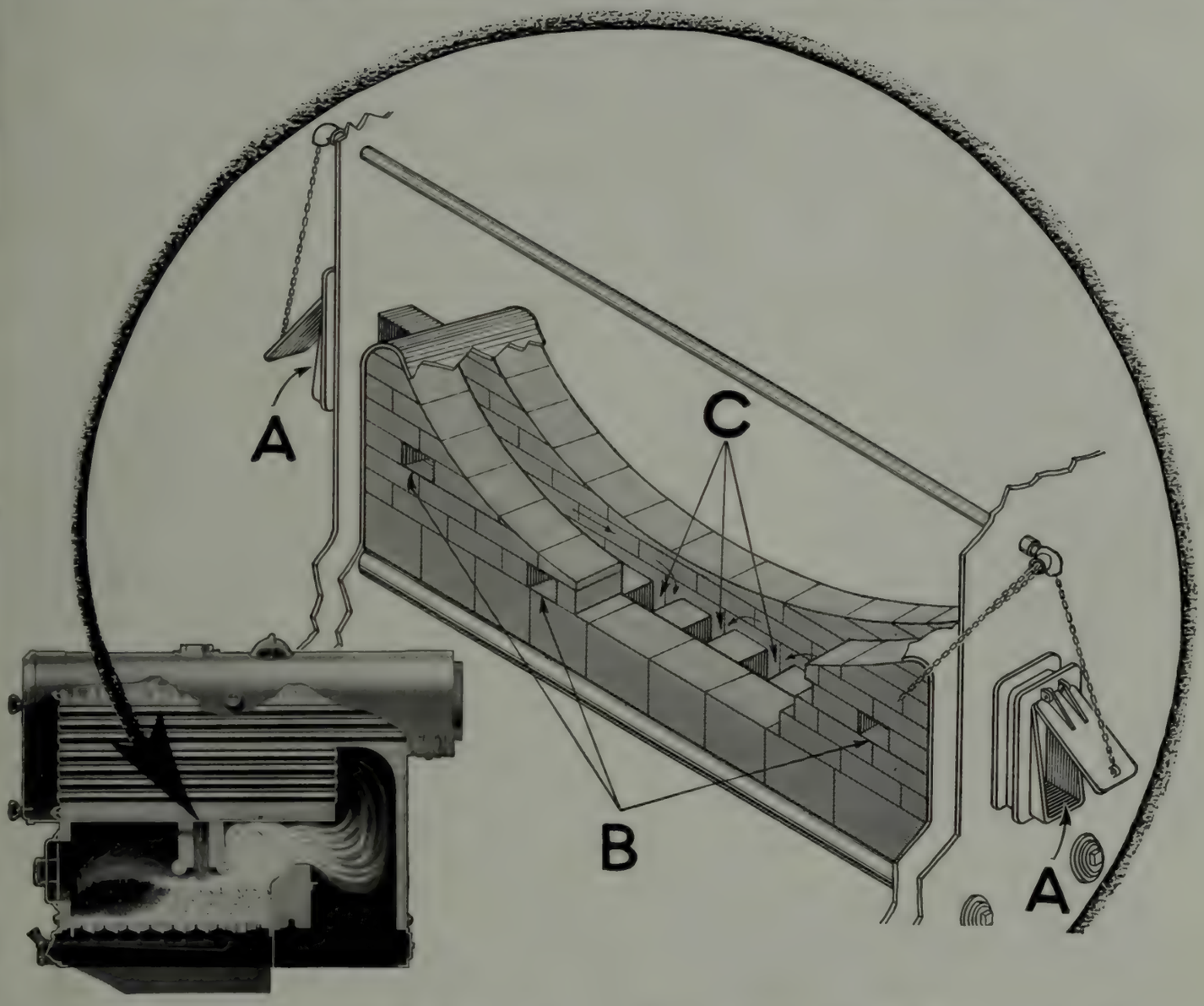
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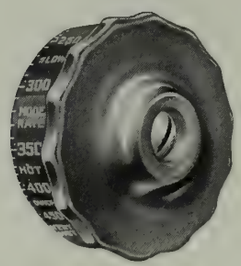
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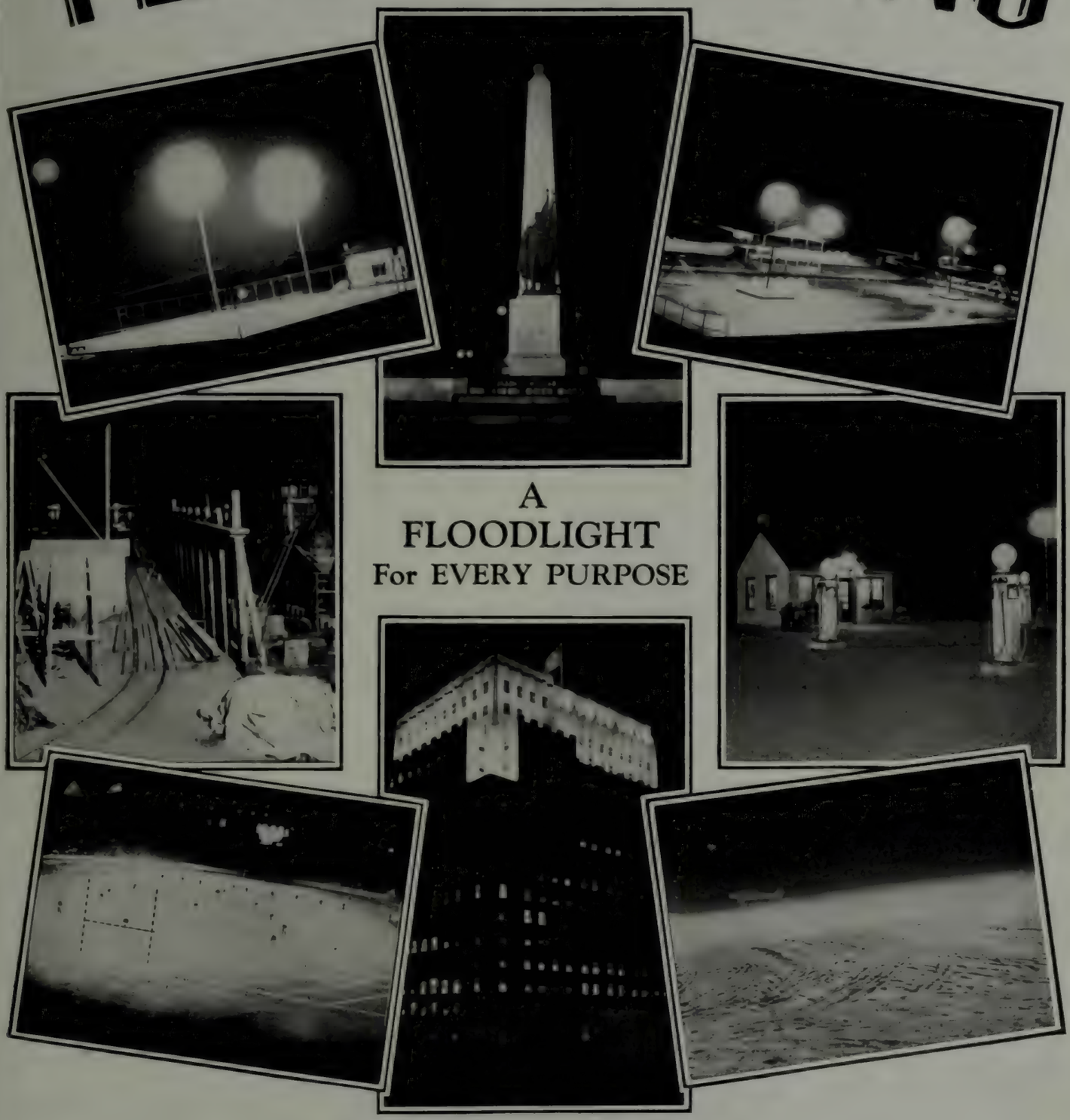
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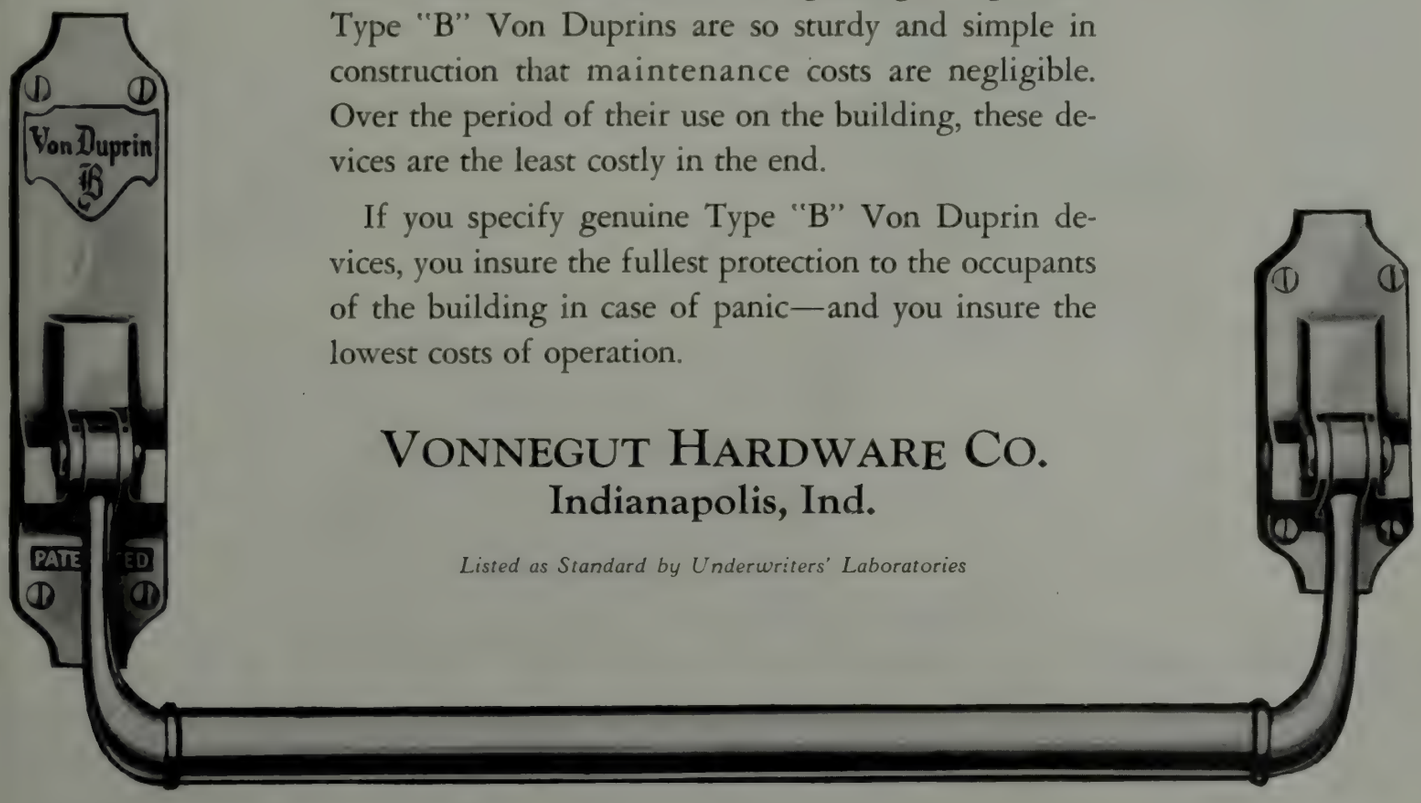
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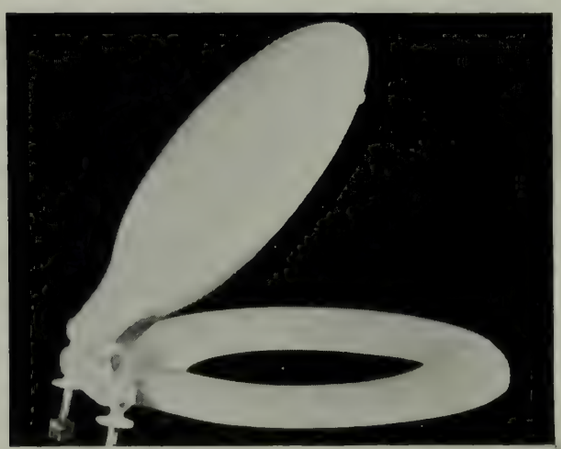
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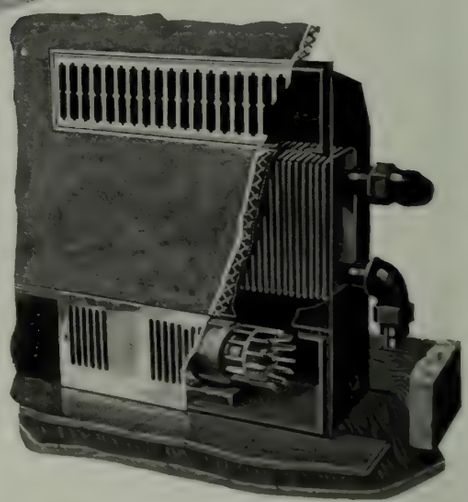
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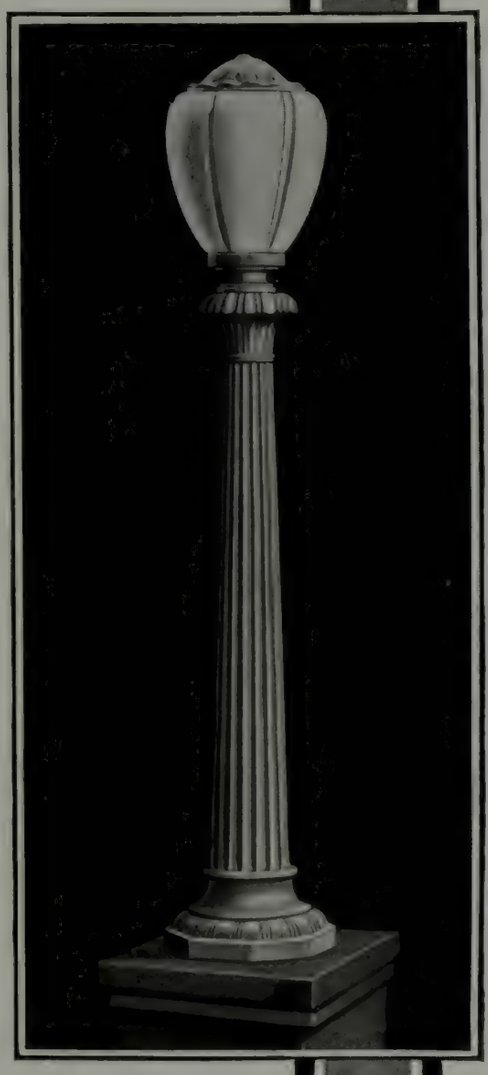
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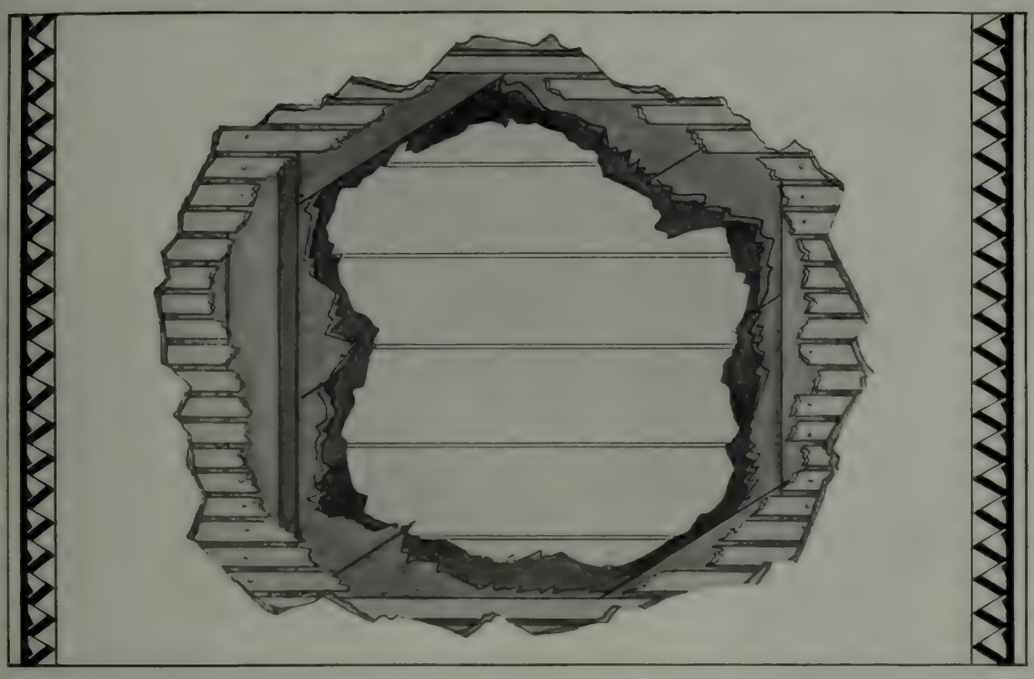
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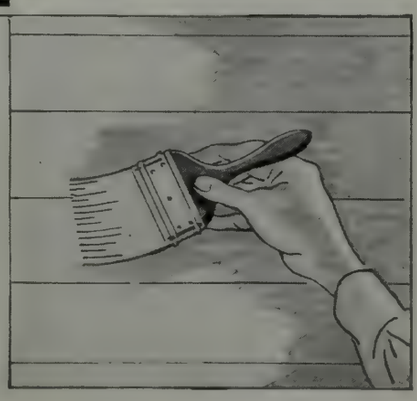
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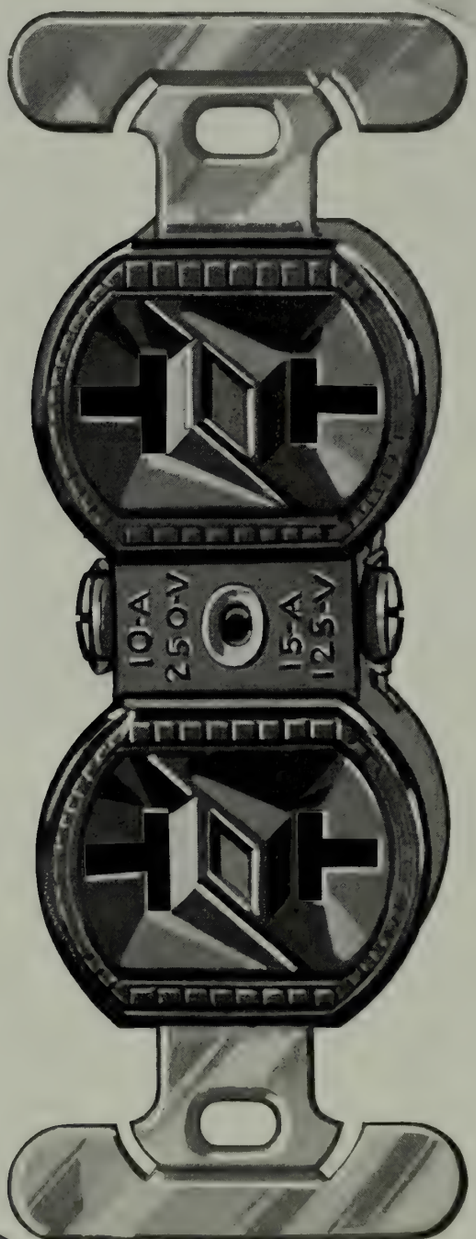
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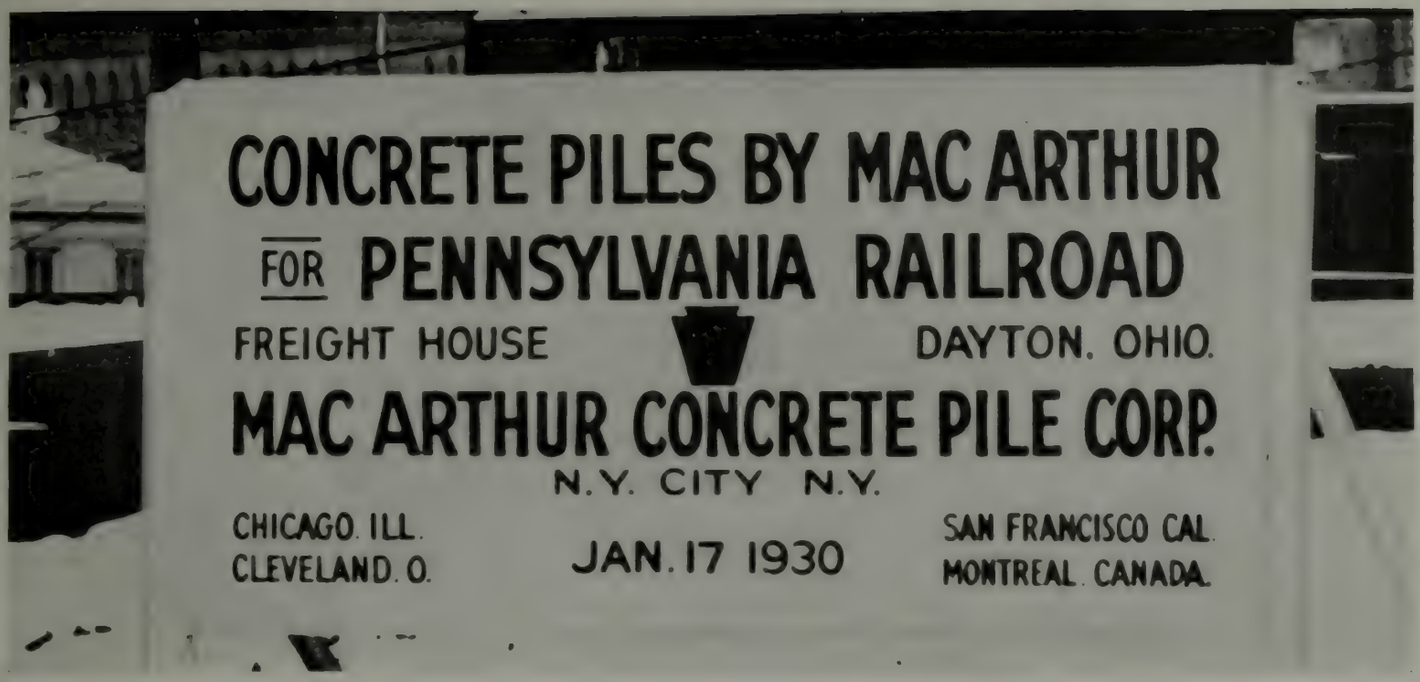
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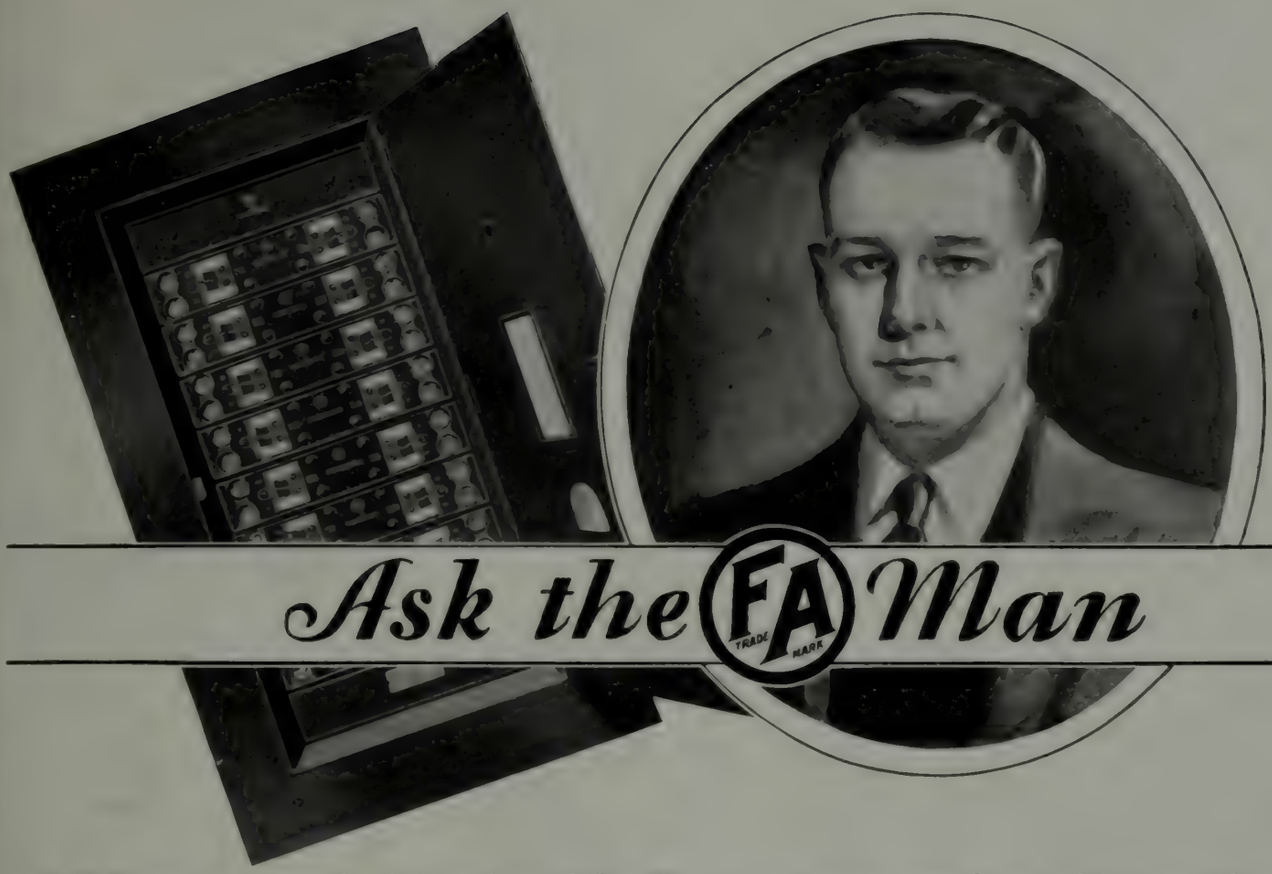
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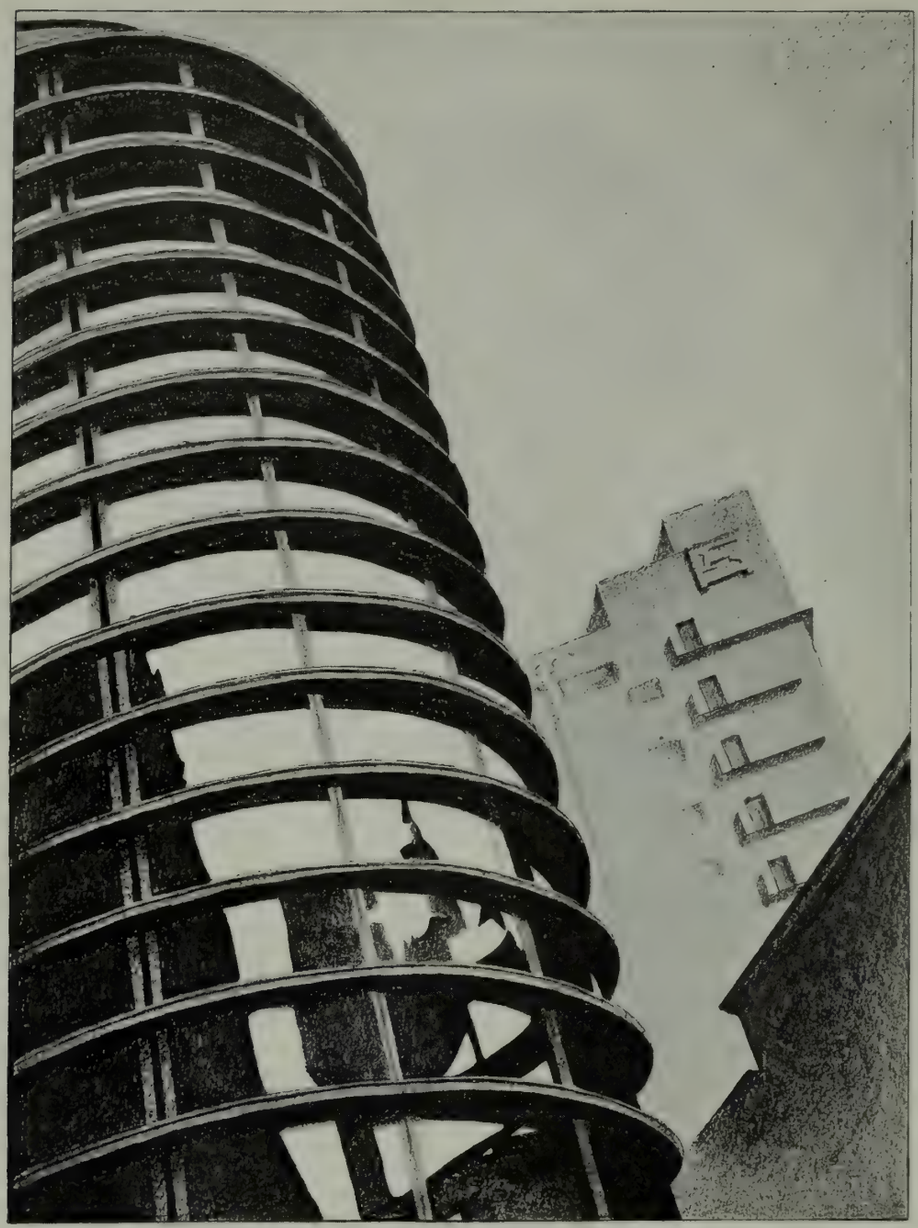
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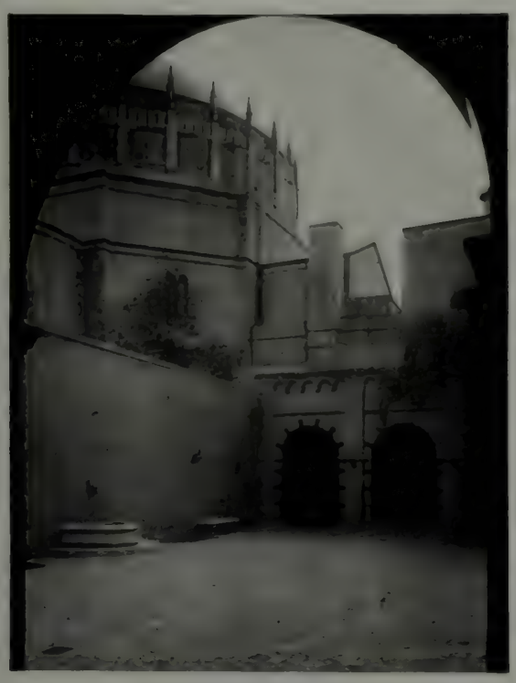
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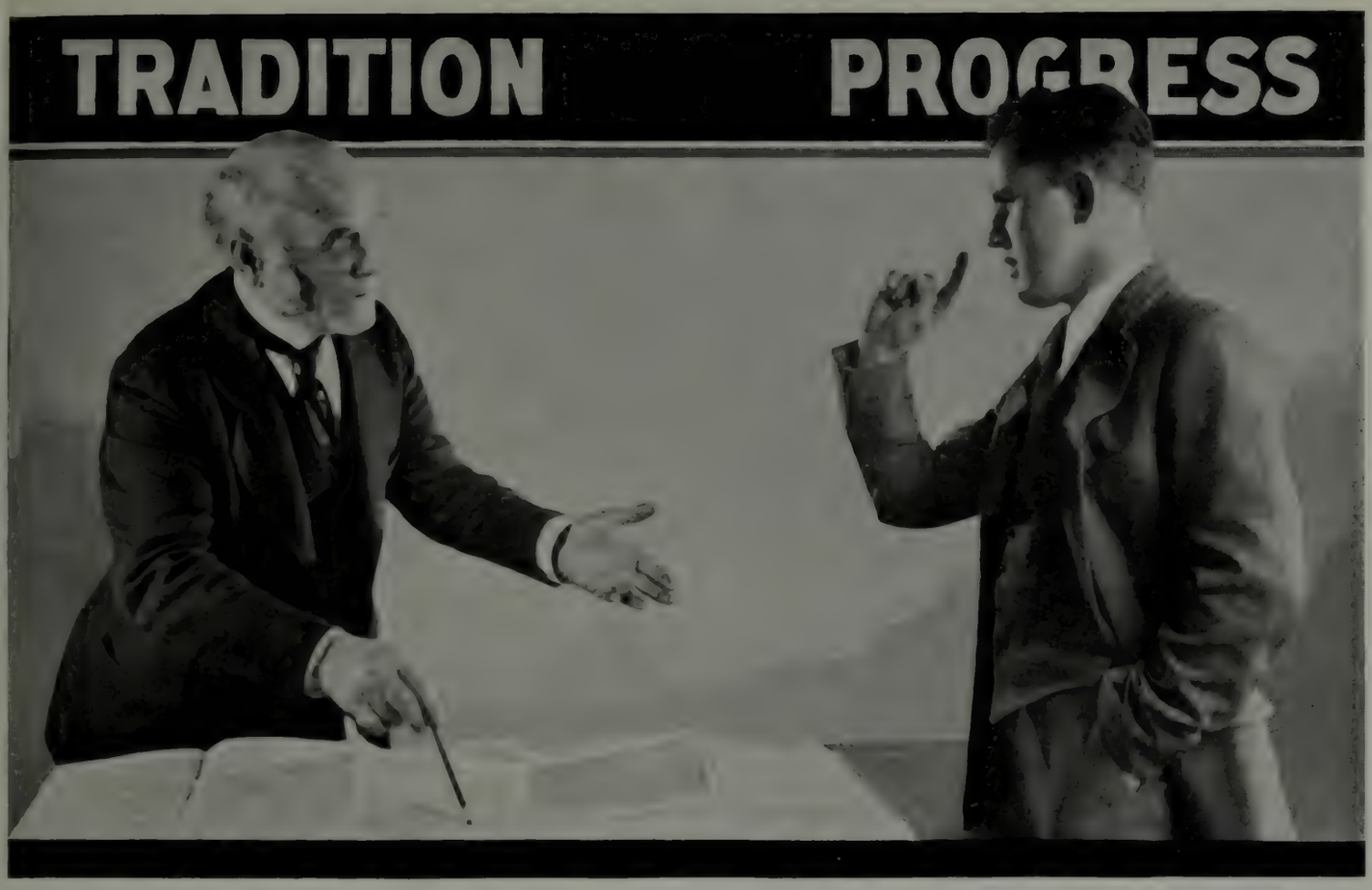
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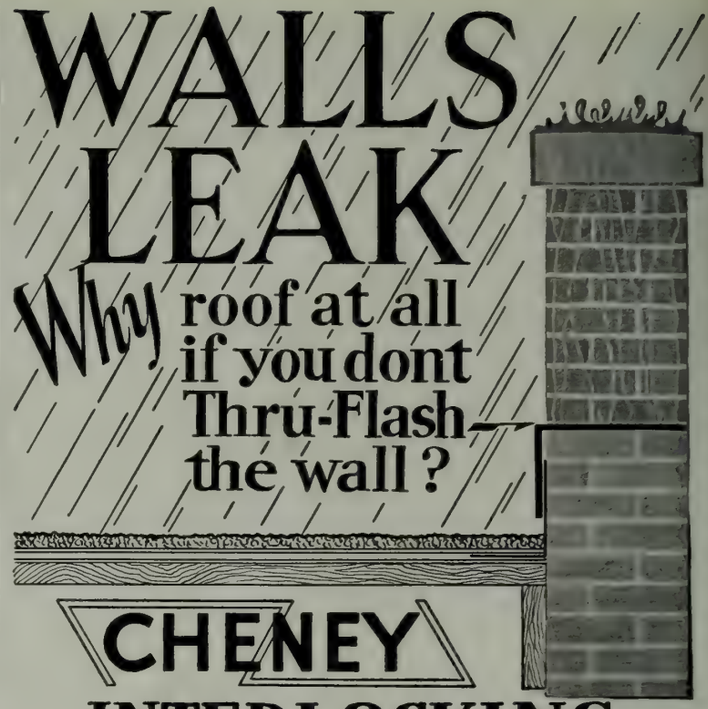
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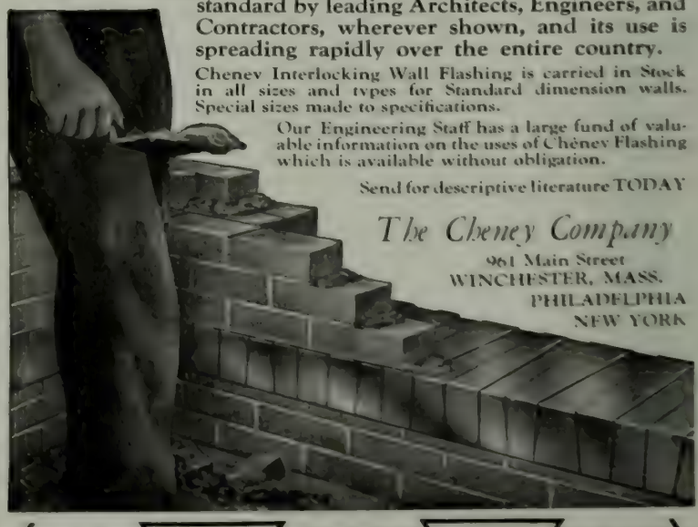
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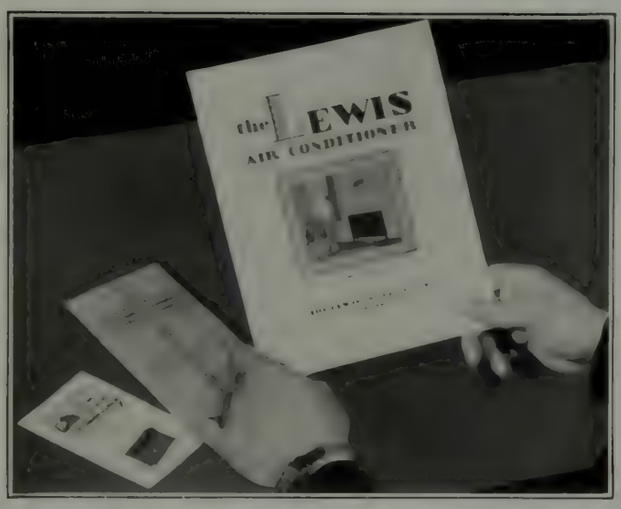


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See Sweet's, A112

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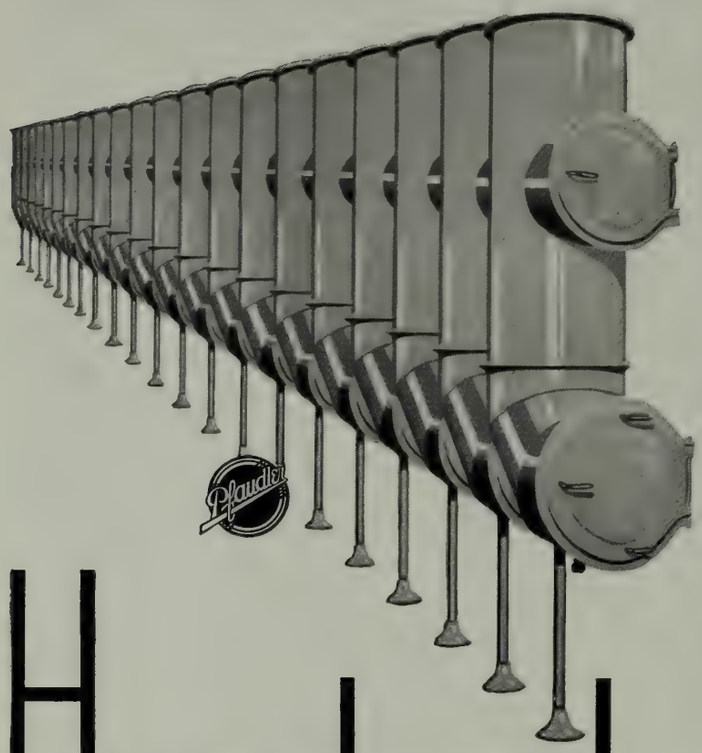
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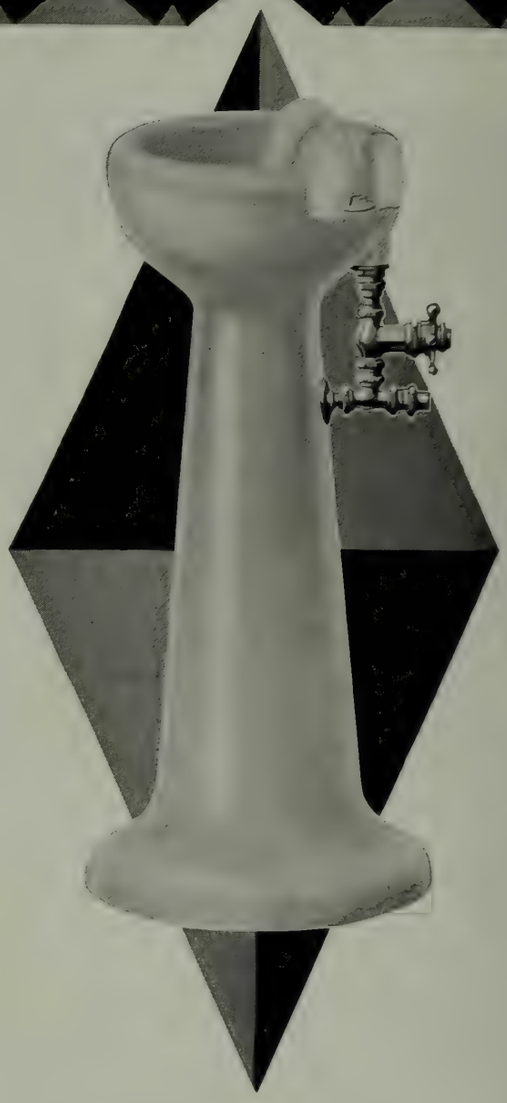
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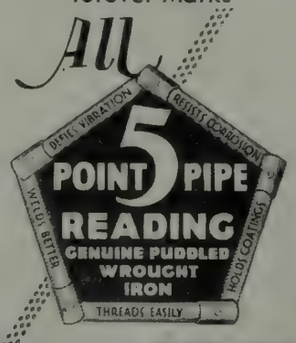
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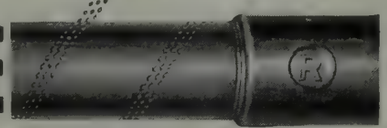
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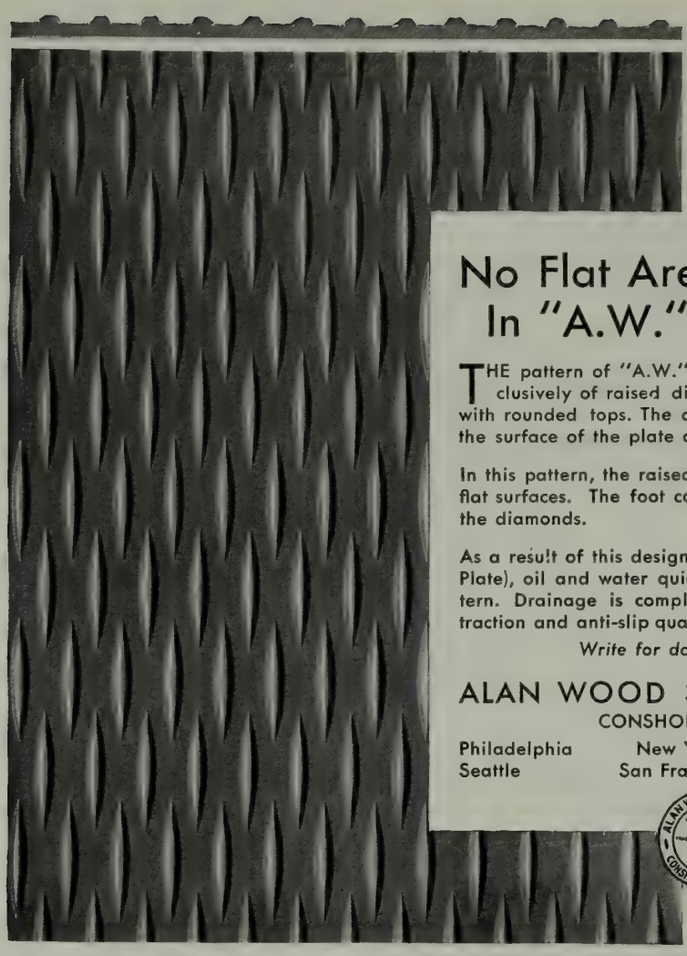




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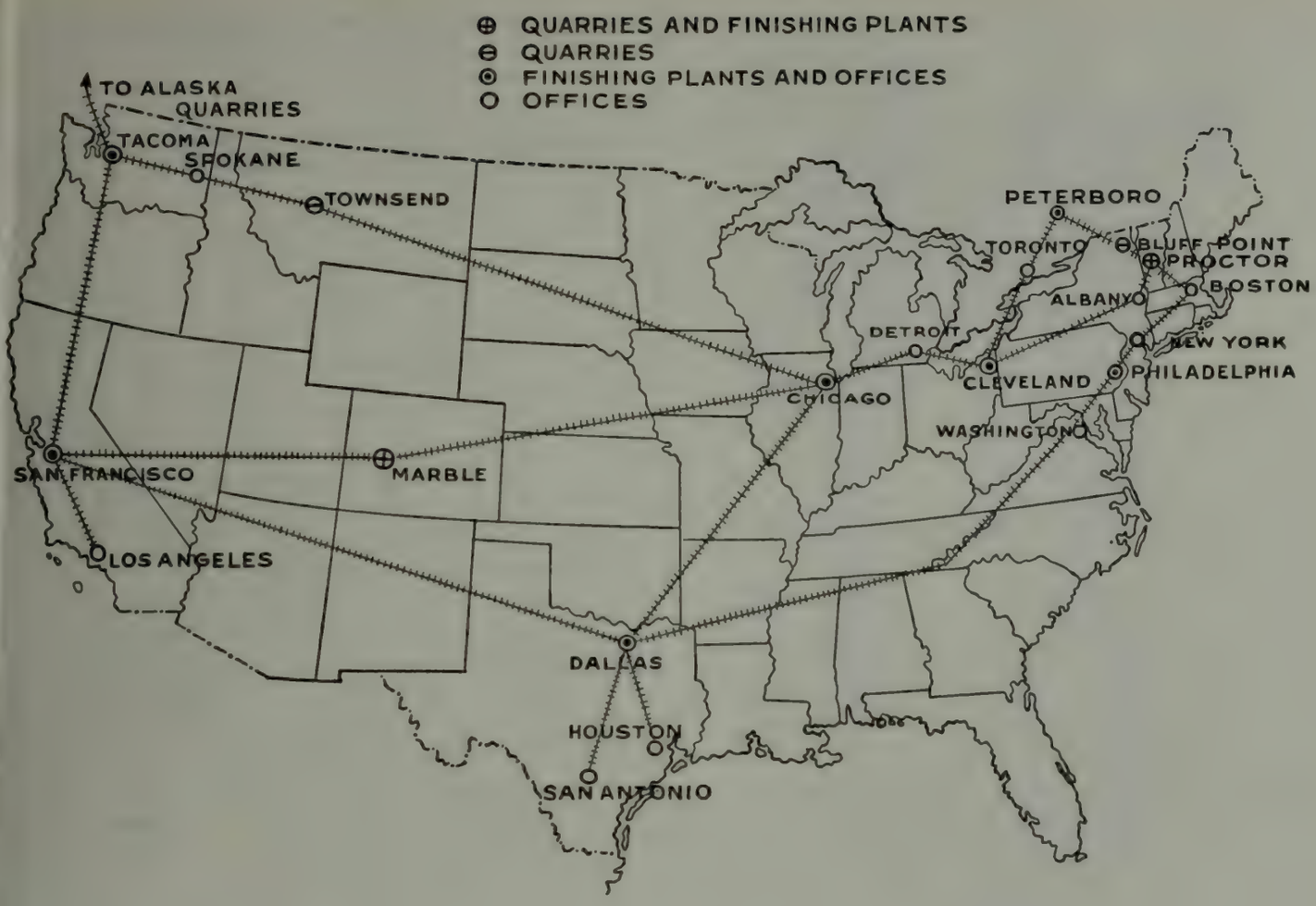
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BY

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With foreword by RALPH ADAMS CRAM

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The text is profusely illustrated with reproductions of photographs and drawings and 9 plates in full color.

TABLE OF CONTENTS

Chapter I—Introductory.
Chapter II—The relative values of historic methods.
Chapter III—The form of artistic impulse that should control architectural color effect.
Chapter IV—Color phenomena that are active in polychromatic effect.
Chapter V—The architectonic objective in Greek polychromy.
Chapter VI—The relation that must be established between structural effect and polychromatic effect.
Chapter VII—The technique of architectural polychromy.
Chapter VIII—The development of color interest through the manipulation of plastic form.
Chapter IX—The polychromatic treatment of architectural detail by the Greeks.
Chapter X—The polychromy of architectural sculpture.
Chapter XI—Critique of certain works bearing upon architectural and sculptural polychromy.
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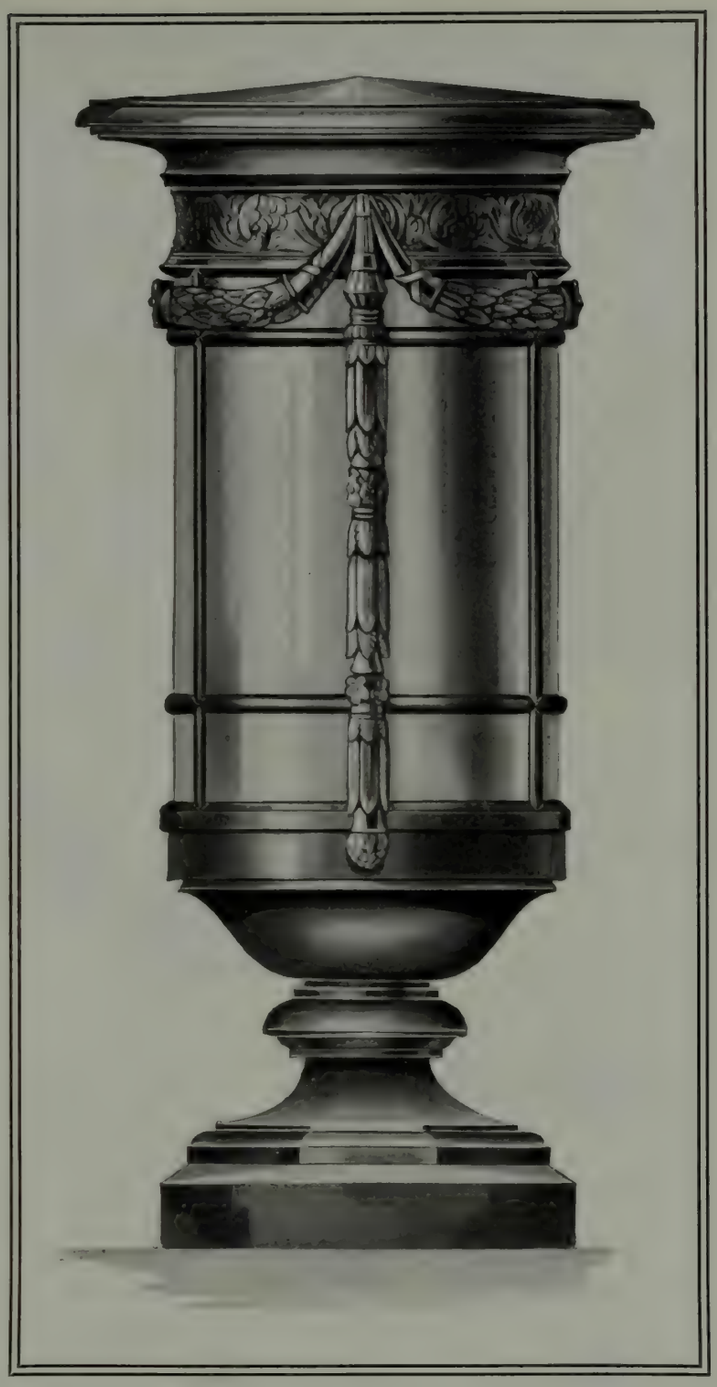
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Overall height 5′ 10¼″
Diameter of Lantern 26″ overall
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Base 25″ square

This pier lantern was made for
THE CAMPBELL MEMORIAL,
Portland, Oregon

The design is by Paul P. Cret, architect

Smyser-Royer Display In Sweet's Catalogue

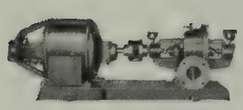
In Sweet's Catalogue, Section D, pages 5334 to 5344, there is a display of 200 Smyser-Royer exterior lamps, lanterns and brackets. These illustrations will display to the reader the high standard of craftsmanship maintained by Smyser-Royer. Exterior fixtures for every period and purpose are produced with equal skill and attention to detail.

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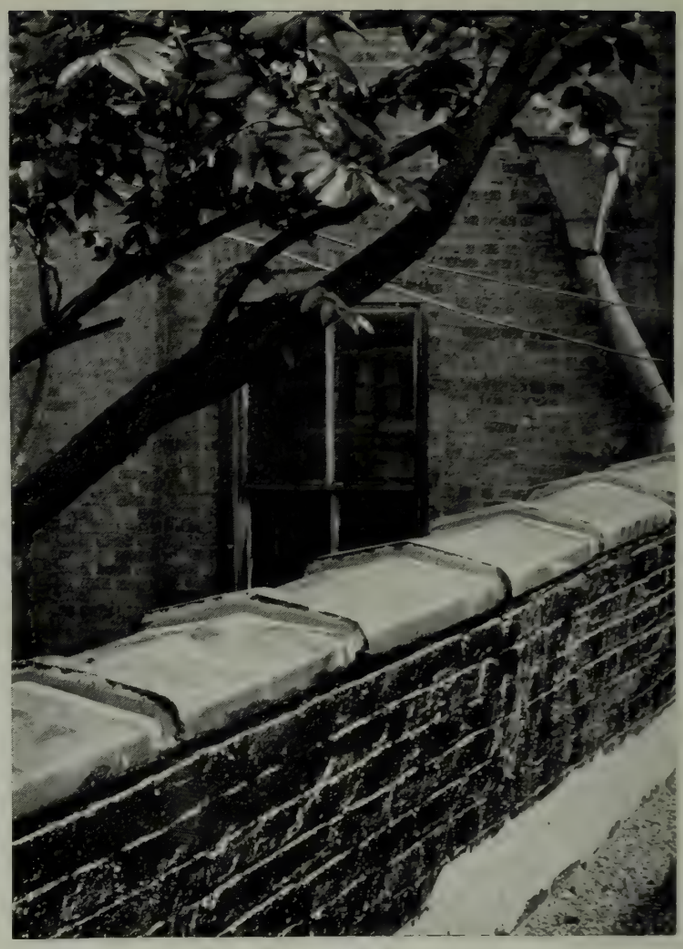
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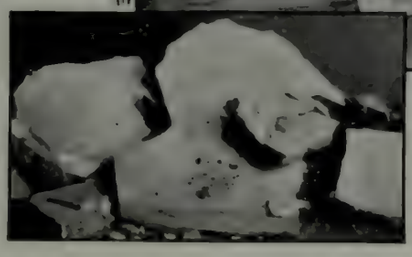
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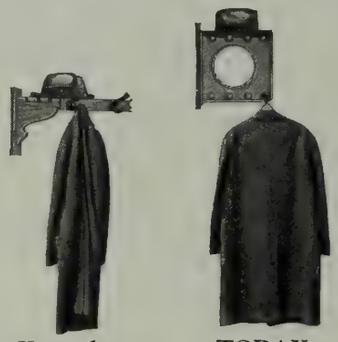
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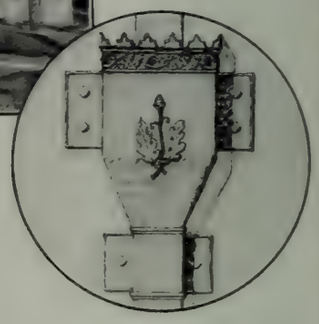
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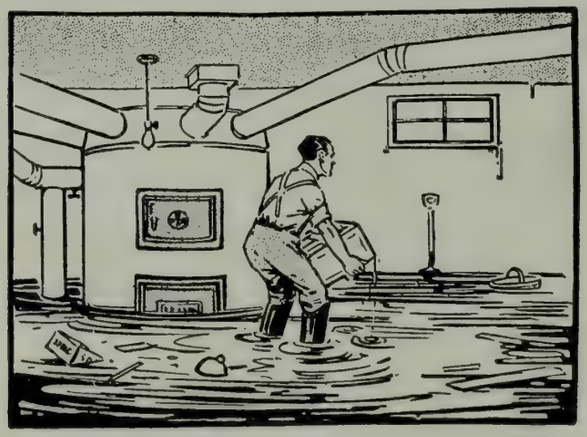
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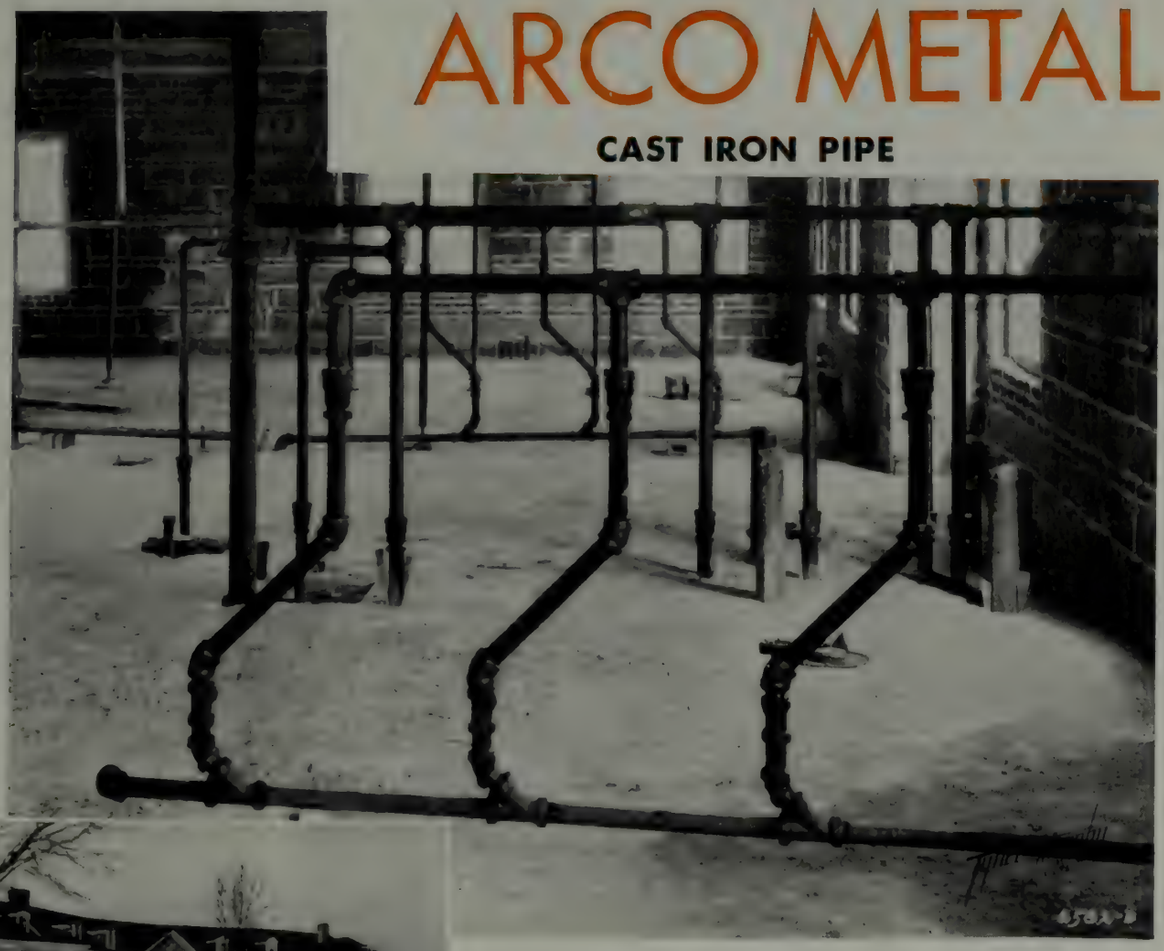
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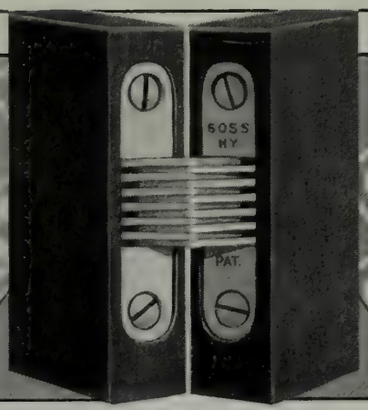
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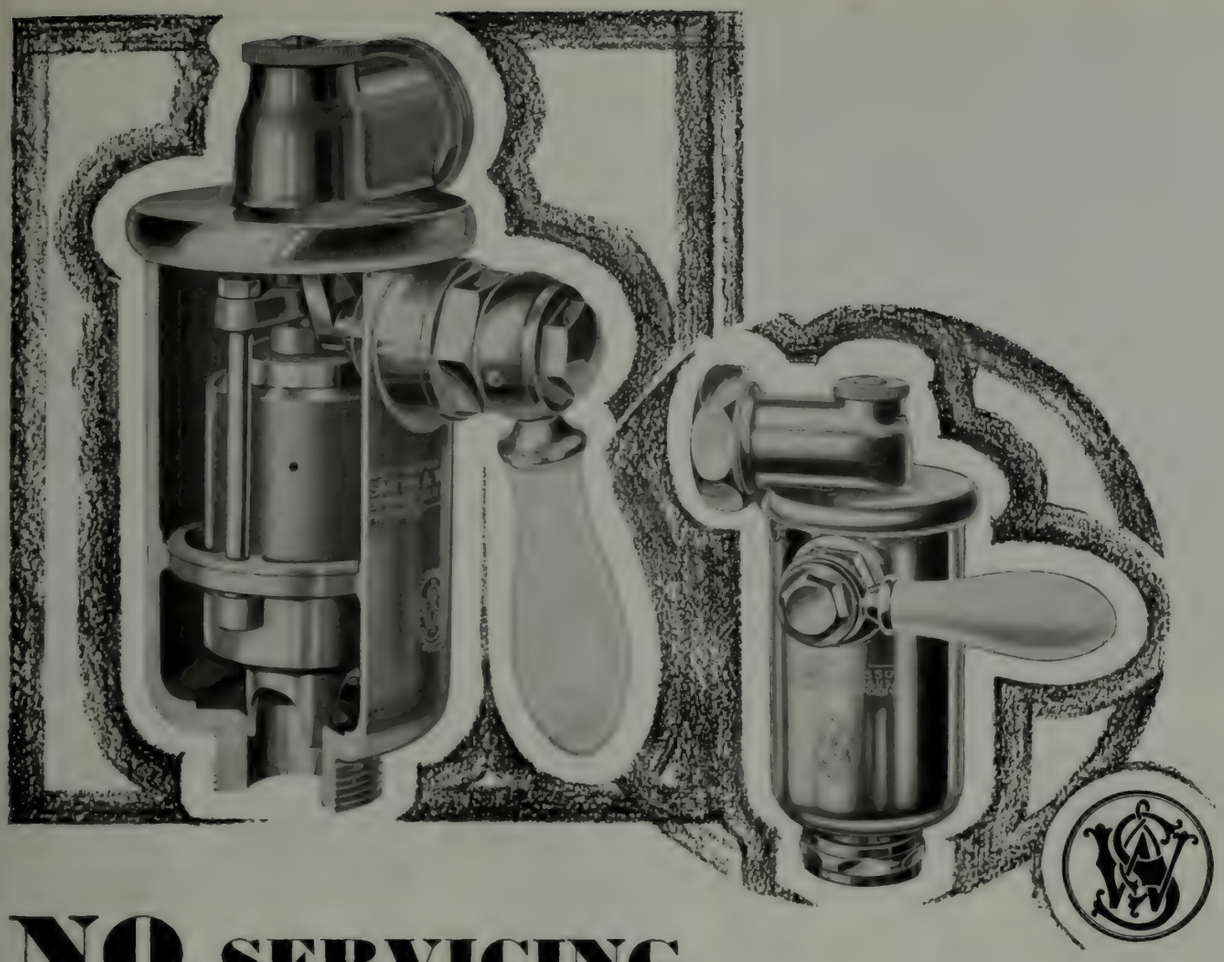


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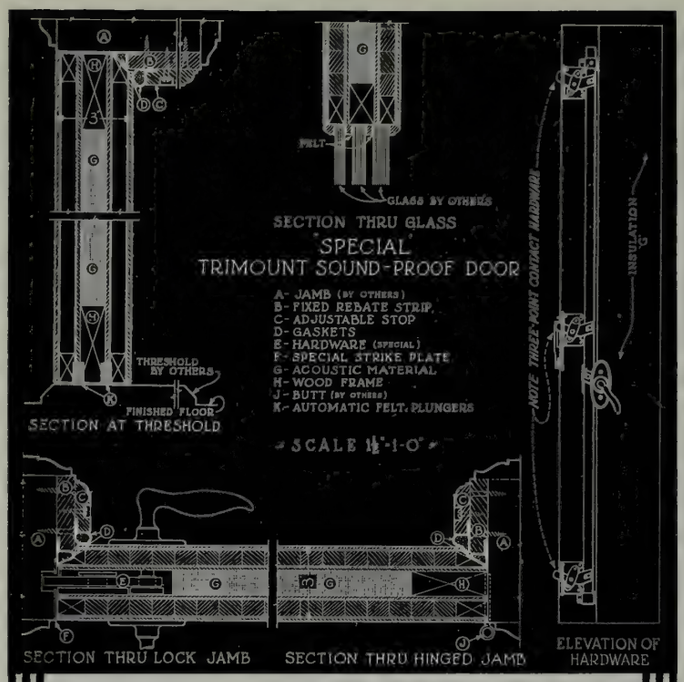
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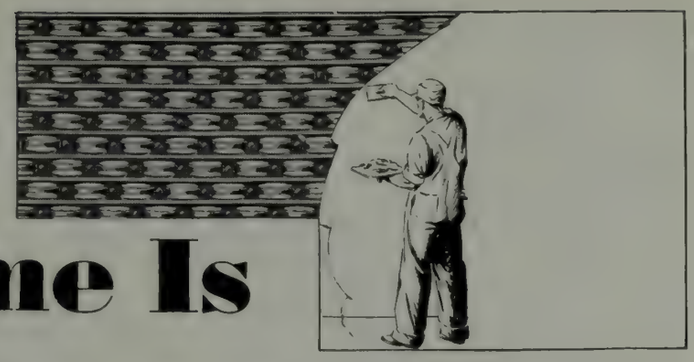
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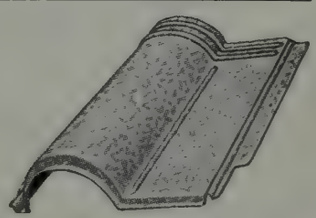
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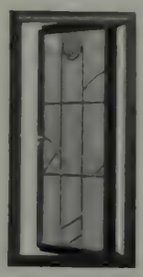
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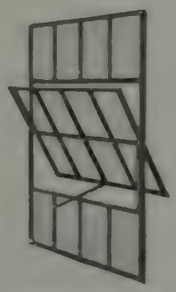
A Bayley representative will gladly call and explain the scope and value of Bayley engineering cooperation on window and door problems. Illustrated folders on window or doors for any type of building will be mailed on request — The William Bayley Co., 132 North St., Springfield, Ohio.



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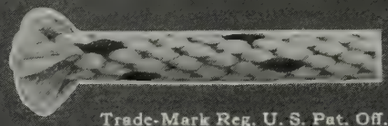
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Boston, 5 Park St.
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Illustration shows work under construction on the hotel "The New Yorker", located on 8th Avenue, 34th to 35th Streets, New York City, which has been recently completed. Sugerman & Berger, Architects, Lange & Noska, Engineers.

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ARCHITECTS' ANNOUNCEMENTS

and Notes in Brief

CALENDAR OF EVENTS
GENERAL ANNOUNCEMENTS

April 5-12	Home Complete Exposition, Indianapolis.
May 20-Oct. 1	Exhibition of modern Architecture and Industrial Arts at Stockholm, Sweden.
May 21-23	American Institute of Architects, Sixty-Third Convention, Mayflower Hotel, Washington, D.C.
May 26-30	Fifth International Congress of Building and Public Works, London.
June 19-30	The Fourth Pan-American Congress of Architects and Architectural Exhibition at Rio de Janeiro.
Aug. 4-9	International Exposition of American Import Trade, Grand Central Palace, N. Y.
September	International Congress of Architects, Budapest.
Nov. 18-29	Art Exhibition, Royal Institute of British Architects, London (9, Conduit Street).

COMPETITIONS

April 12	Sketch given out, Booth Traveling Fellowship, University of Michigan College of Architecture. Open only to graduates of this school, under 31. For details address the College.
April 14	Third competition for the A. W. Brown Travelling Scholarship, to be held under the direction of a committee of the American Institute of Architects. A two thousand dollar scholarship towards the expenses of a year of travel and study in Europe by an architect or architectural draftsman. For application blanks write to the secretary of the committee, Wm. Dewey Foster, 25 West 45th Street, New York City.
April 19	Closing date for competitors for the Prince-Architectural Prizes of eight hundred dollars ($800) each, in the School of Architecture, Princeton University for the year 1930-31. For application blanks and regulations governing the competition and award address the Director, the School of Architecture, Princeton University, Princeton, New Jersey.

ROY C. ARNHOLD, architect, announces the removal of his offices to 910 Staley Building, Wichita Falls, Texas.

CONRAD & CUMMINGS, associated architects, are now located at 509 Binghamton Savings Bank Building, Binghamton, New York.

WILLIAM E. HAUGAARD, architect, announces the removal of his offices to 21 West 45th Street, New York City.

ANNOUNCEMENT is made that S. R. Burns has retired from the firm of Hunt & Burns, Architects. The practice will be continued by Sumner P. Hunt, under his own name, at the same address, seventh floor, Laughlin Building, Los Angeles, California.

OSCAR SCHMIDT, architect, announces the removal of his offices to 2732 Atlantic Avenue, Atlantic City, N. J.

FRANK A. WINN, JR., architect, announces the removal of his office to the Stovall Office Building, Tampa and Madison Streets, Tampa, Florida.

DESIGN FOR A PRADO

The Williams and Matilda Sparks Foundation, Inc. invites competion for the entrance design to its Prado or walk. This institution will have a tower 200 feet high, a golf course, tennis courts, an outdoor amphitheatre with a seating capacity of 15,000, canals and the above mentioned Prado 20 feet wide, 2100 feet long. The Foundation is located in Jackson, Michigan, covering 465 acres of land.

April 15th, 1930 is the closing date for the submission of all designs. The cost of the entrance itself is to be from five to ten thousand dollars. It should be designed in either stone or brick. All designs are to be on sheets 15 x 20 inches, and may be in perspective or plan and elevation, in water color, ink, pencil, or crayon.

First Prize, $250.00 cash, Second Prize, $100.00 cash, and Third Prize, $50.00 cash.

All designs and communications may be addressed to A. W. D. Hall, Chief Engineer, The Williams and Matilda Sparks Foundation, Inc., 313 Carter Building, Jackson, Michigan.

A.I.A. HONOR AWARDS

A system of honor awards, "creating year by year a visible history of the advance of architecture in the nation's cities," is being developed by the A. I. A.

A definite plan governing the determination of exceptional architectural merit has been adopted, and will be carried out by Chapters all over the country, it is announced by C. Herrick Hammond of Chicago, President of the Institute.

The plan, Mr. Hammond said, represents nation-wide extension under uniform control of honor award programs already sponsored by Chapters in New York, Chicago, Los Angeles, and other cities. The results, he pointed out, have justified the effort, as evidenced in awakened interest in good architecture and noticeable improvement in the quality of buildings recently erected.

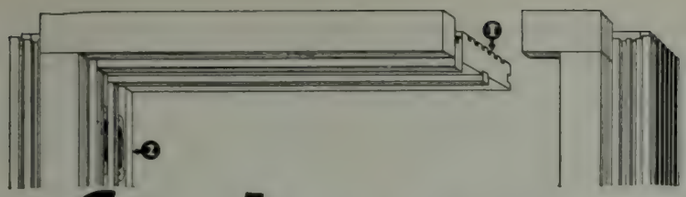
The Minnesota Chapter, Mr. Hammond also announced, has decided to issue awards for the best in Minneapolis architecture. Similar action, it is expected, will be taken by other Chapters so that eventually distinction in architecture will annually receive public recognition throughout the United States.

The honor plan was framed by a special committee of the Institute of which David J. Witmer of Los Angeles is chairman. Other members are:

Joseph D. Leland, Boston; Raymond Hood, New York; John P. B. Sinkler, Philadelphia; Nat G. Walker, Ft. Myers, Fla.; Pierre Blouke, Chicago; George W. Spearl, St. Louis; Ralph H. Cameron, San Antonio; Arthur Loveless, Seattle; Raymond W. Jeans, San Francisco.

Awards will be determined by a jury selected by the Executive Committee of the Chapter from nominations

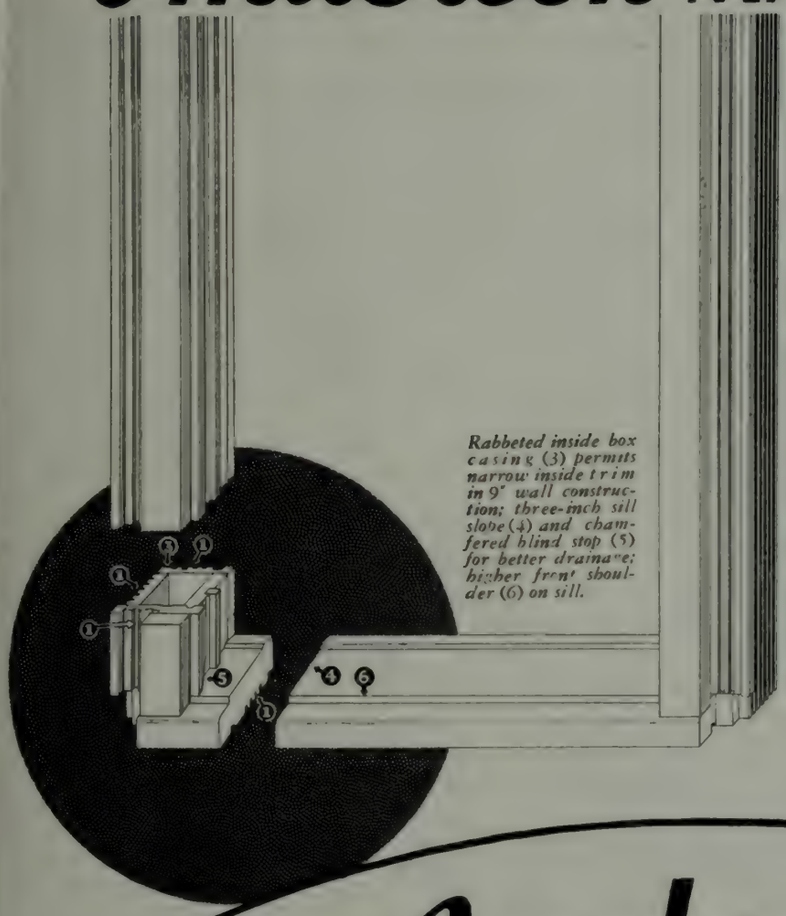
(Continued on page 194)



Mortar clinch grooves (1) on all surfaces making contact with masonry make the frame practically self-caulking; Andersen patented noiseless sash pulleys (2) now have machine-turned wheels.

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made by the Chapter Committee on Honor Awards. Each jury is to consist of three corporate members of the Institute not members of the awarding Chapter.

The awards apply to plan, function, and design in the following groupings: Dwellings, multiple dwellings, commercial buildings, quasi-public buildings, public schools, public buildings.

Additional awards will be made in the following groups: Group planning, city, community, and regional planning, landscape, memorials, any of the fine arts, any of the applied arts, any of the industrial arts as distinguished from the applied arts.

"A wide distribution of classification," said the Committee's report to the Board of Directors of the Institute, "does not make for a complicated program in operation. There are many types, for instance, of commercial buildings. This activity is educational and does not seek primarily to honor the creating artist.

"Therefore, if a splitting up of a group can be made whereby into each section of that group can be placed buildings of like trait so that they can be judged without conflict with buildings of a similar classification but with a different primary trait, the educational value will be furthered and the operation of the program simplified."

CHARLES MORRIS

1869–1930

The death of Charles Morris in Cleveland on January 27th, removes from the profession an architect of real ability and a man of high ethical standards. It ends for me a friendship which began in 1891 when I innocently strolled into the Atelier Laloux in Paris, with a letter of introduction to Morris from the late Thomas Hastings. Morris hurried me out in time to avoid the usual practical jokes played on visitors and we became at once intimate friends. We prepared the admission examinations together and together we bicycled through Touraine and Normandy.

Morris had the unique distinction of being the first employee of the firm of Carerre and Hastings, and to that office he returned for a time after his work at the Beaux-Arts. Later he formed a partnership with Richard Walker, doing excellent work, including a number of the Carnegie Library branches in Brooklyn. In 1902 he and I were asked to go to Cleveland to help on the design of the new Court House. After a few weeks of study on the plans the architects asked one or the other of us to stay on in Cleveland and carry the work through. This Morris did, with the result that Cleveland has one of the finest court houses in the country.

Upon his return to New York, Walker and Morris won the Twenty-Second Regiment Armory in competition, served as architects for the Municipal Ferry houses at South Ferry and the Bridge and Pavilions on Riverside Drive at Ninety-Fifth Street. Unfortunately, the partnership broke up just when success seemed to be knocking at the door. Charles Morris was then appointed Chief Designer in the office of the Supervising Architect of the Treasury where he greatly raised the standard of design. Hundreds of well designed post offices throughout the country are today a credit to his ability. With our entry into the war the appropriations for government work were discontinued and the Supervising Archirect's office practically stopped work.

After winding up his work in Washington, Morris returned to Cleveland and in 1923, formed the firm of Morris and Weinberg, to whom success was coming in a widening field when his fatal illness began. Some three years ago he was forced to suffer amputation of his leg, but far from discouraging him this handicap seemed to render him more optimistic and even more courageous in overcoming difficulties.

He was elected to Fellowship in the Institute in 1925 and also served as President of the Cleveland Chapter the following year. During all his practice he had shown special interest in architectural education, being one of the early members of the Society of Beaux-Arts Architects and serving on its Juries from time to time. He was one of the Founders of the Cleveland School of Architecture in 1922 and served as Secretary and Treasurer of the Board of Trustees until the school became officially affiliated with Western Reserve University in 1928. He remained as a member of the Board of Trustees until his death.

Charles Morris was a fine man and a true and loyal friend. Through many years he persevered without receiving the credit which was his due. In the last years of his life, though working under a severe handicap, he achieved his greatest success.

CHARLES BUTLER.

A THIRTEEN-PERIOD YEAR

The Square D Company, of Detroit, Mich., announces that all accounts, salaries and internal records of the company will now be handled on the basis of the "thirteen-period" year. The Square D Company manufactures electrical control equipment.

The new system replaces the former one of calendar months. For many years there has been considerable agitation, the world over, in favor of the thirteen-period year. A special investigation of it was conducted by the League of Nations in 1926. Today many large companies are using it as their method of operation, among them the Eastman Kodak Co., Sears, Roebuck and Co., Fuller Brush Co., C. G. Conn., Ltd., Loew's, Inc., Hicock Mfg. Co., Lukens Steel Co., and the Graton and Knight Mfg. Co. The National Association of Cost Accountants has placed itself on record as definitely in favor of it.

Under the thirteen-period year, there are exactly the same number of weeks—four—and the same number of days—28—in each of the periods, making it possible to compare operating figures among periods without any adjustment as to time units.

On this basis, all comparisons will mean a great deal more and will be considerably more serviceable than under the old system of calendar months. Under the old method, for example, the reports for February, 1929, covered only 20 working days, while the October, 1929, reports were for 23 working days, a variation of 15 per cent.

Under the thirteen-month system of operation, the customary method of referring to period dates is as follows: 3 P 27–30, meaning 27th day of the third period, 1930. However, in stating dates generally, the regular twelve-month calendar dates are used.

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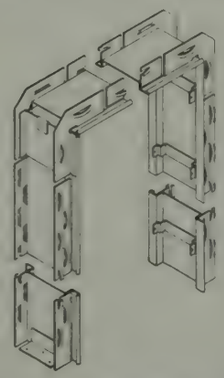
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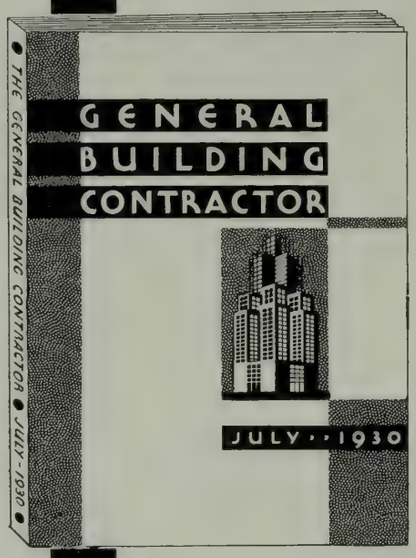


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THEODORE CRANE
Editor

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Closely associated with Mr. Crane will be Peter A. Stone, who brings his experience as editor of "The American Contractor" to his new position. His broad understanding of the building field and his specialized knowledge of the particular type of contractor for whom the new magazine is edited, will contribute greatly to making and keeping this publication interesting and helpful.

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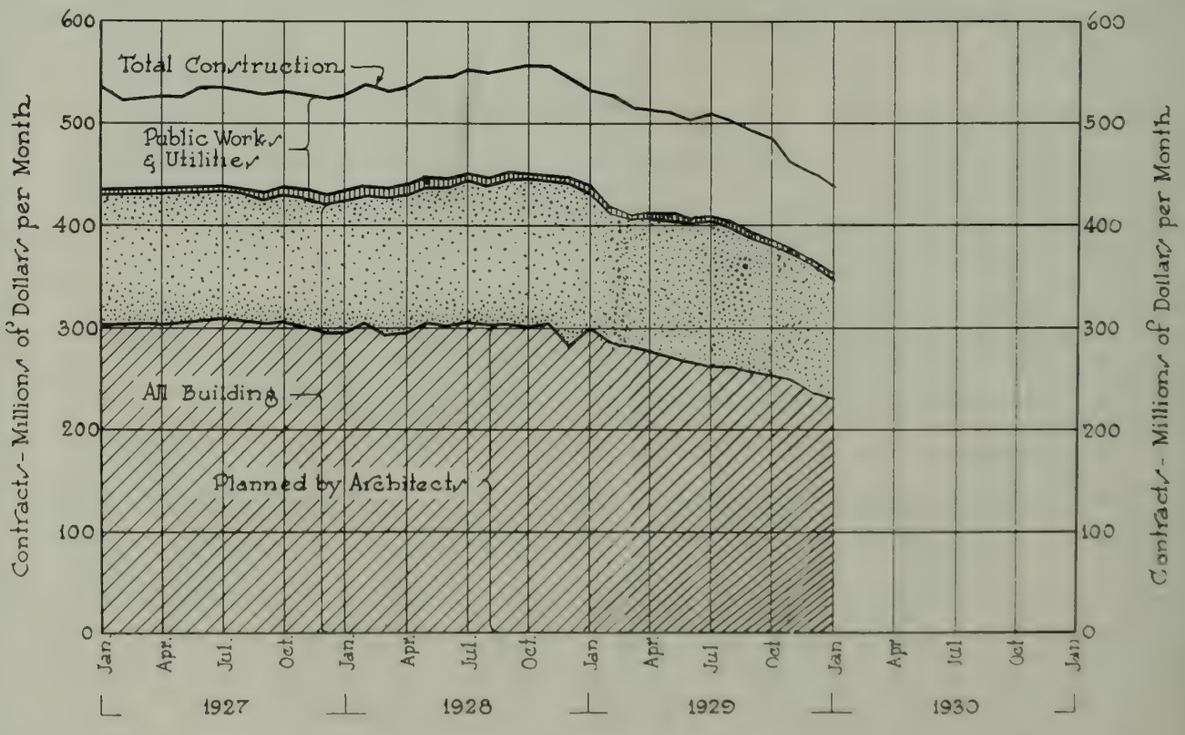
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CONSTRUCTION STATISTICS

From the records of F. W. DODGE CORPORATION, Statistical Division. The figures cover the 37 states east of the Rocky Mountains and represent about 91 per cent. of the country's construction volume.

January, 1930

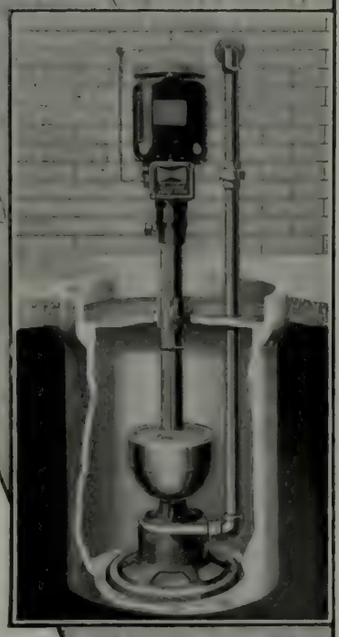
Classification	TOTAL CONTRACTS Number of Projects	TOTAL CONTRACTS Valuation	WORK PLANNED BY ARCHITECTS Number of Projects	WORK PLANNED BY ARCHITECTS Valuation	Per Cent. of Total
Commercial Buildings	1,670	$ 54,052,300	634	$ 43,031,000	80
Industrial Buildings	379	38,266,200	149	27,062,600	71
Educational Buildings	182	19,009,200	150	18,041,100	95
Hospitals & Institutions	63	6,783,400	48	5,899,500	87
Public Buildings	69	8,567,100	40	8,173,300	95
Religious & Memorial Buildings	103	5,504,400	64	4,995,900	91
Social & Recreational Projects	153	13,095,500	93	11,805,500	90
Residential Buildings	4,168	66,631,900	1,059	37,555,100	56
Total Building	6,787	211,910,000	2,237	156,564,000	74
Public Works & Utilities	800	112,065,200	29	5,018,900	4
Total Construction	7,587	$323,975,200	2,266	$161,582,900	50
Total Construction, January, 1929	10,190	$409,967,900	3,133	$221,606,600	54



General Trend of Building and Engineering Construction

when it RAINS *and* RAINS *and* RAINS





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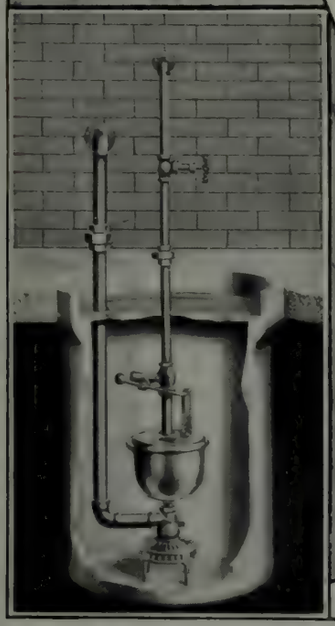
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CATALOGUES IN SWEET'S FOR 1930

More than 1800 manufacturers filed their catalogues in Sweet's Architectural Catalogues for 1930 to give architects the information they want and need for selection and specification purposes. Some of these catalogues were reviewed in this Department of The Architectural Record for March 1930 and others are reviewed below. They are typical of hundreds of others which cannot all be reviewed because of space limitations.

Portland Cement and its Uses

The Portland Cement Association, a national organization to improve and extend the uses of cement, is represented therein. Attention is called to an extensive service established by the manufacturers of Portland cement for the benefit of users and prospective users of cement. The catalogue in Sweet's File includes illustrations of stucco textures, typical wall sections showing concrete masonry and monolithic concrete and specifications for cast stone. 6 pp. Portland Cement Association, Chicago, Ill.

Indiana Limestone

Complete description of this well-known product, including classification of varieties, costs, colors, and textures, description of grades, physical characteristics, finishes, uses, together with 3 pages of specifications form a very comprehensive exposition of The Indiana Limestone Company's products. 8 pp. Indiana Limestone Company, Bedford, Indiana.

Built-Up Roofing, Waterproofing, Heat Insulation

The Philip Carey Company present 4 catalogues. These catalogues give descriptions and specifications of their waterproofing and dampproofing materials, built-up roofing, asbestos cement shingles, pipe covering, boiler insulation and refractory cements. 15 pp. Philip Carey Company, Lockland, Cincinnati, Ohio.

Cement Floor Hardeners, Colorings and Waterproofing

The Master Builders Company have a catalogue which presents descriptions, illustrations and specifications of their metallic, colored and colorless cement floor hardeners, decorative liquid penetrants, waterproof surface treatments and integral waterproofings. 13 pp. The Master Builders Company, Cleveland, Ohio.

National Building Granite Quarries Association

This association was founded for the purpose of furthering the use and sale of granite for building purposes by extending the knowledge of its many qualities and merits. To promulgate the policies and accumulated information of the Association, 17 pages have been taken to set forth the classification of granite, methods of effecting economies in design, standards of quality, standard grades of finishes, and short-form and complete-form specifications. 17 pp. National Building Granite Quarries Association, Boston, Mass.

Cellized Oak Flooring

Oak flooring chemically treated to reduce the tendency toward shrinkage or expansion and to prevent decay and damage by wood-boring insects is fully described, illustrated and specified in the 3 page catalogue of the Cellized Oak Flooring Inc., 3 pp. Cellized Oak Flooring Inc., Memphis, Tenn.

(Continued on page 200)

The Invisible Superintendent *at the* Mortar Box *Puts the Required Strength in the Mortar*

WHEN the architect specifies one part BRIXMENT, three parts sand (no lime, no portland), the strength of the mortar is certain. If oversanded, BRIXMENT mortar works short and, since there is no lime in the mix, the necessary plasticity can be secured only by using the proper amount of BRIXMENT.

BRIXMENT mortar has greater strength than that required by the building code of any city for the heaviest load-bearing walls. Its strength increases with age, becoming greater than that of the brick itself. When tested in piers it approaches that of straight 3-to-1 portland-cement mortar. This makes it suitable for foundation, load-bearing or parapet walls and even for tall, free-standing stacks.

BRIXMENT makes a stronger, tighter bond between the brick and the mortar. It is ground finer and hardens more slowly than portland, thus permitting deeper penetration and a more thorough keying into the pores of the brick. Louisville Cement Company, *Incorporated*, Louisville, Kentucky.

District Sales Offices: 1610 Builders Bldg., *Chicago*; 301 Rose Bldg., *Cleveland*; 602 Murphy Bldg., *Detroit*; 101 Park Ave., *New York*

BRIXMENT
for Mortar and Stucco

Among the many BRIXMENT *stacks is the 250-foot radial-tile smoke-stack at the power plant of Purdue University.*





ABolite "GLASS-STEEL" REFLECTORS

Installed in the engineering machine shop of the plant of the Gabriel Snubber Mfg. Co., Cleveland, Ohio, result in an average illumination of 18 foot candles. These are standard 20″ ABolite Glass-Steel diffusers with white glass globes using 300 Watt clear lamps. The units are spaced 10′ x 12′ centers, mounted 12′ above the floor.

For office and any industrial lighting problems where some ceiling-reflected illumination is necessary, this Glass-Steel unit has become a favorite because its porcelain enameled steel reflector directs the light over a given area and the glass bowl diffuses the light into a soft, clear glow.

All ABolite Reflectors have the heavy round, closed bead edge for strength. All ABolites are drawn from Armco Ingot Iron and perfectly porcelain enameled.

Write now for catalog No. 180. This gives all data on the complete line of ABolite Reflectors.

The ABolite Reflector Co.
AR
Main Office and Factory, West Lafayette, Ohio



CATALOGUES IN SWEET'S FOR 1930—Continued

HOLLOW METAL DOORS AND TRIM AND WALL DUCTS

Five pages of detail drawings and one page of general description make up a comprehensive catalogue of The Jamestown Metal Desk Company's hollow metal doors and trim and elevator enclosures. Two pages are devoted to describe Jonesteel wall duct for use in wiring systems. 8 pp. Jamestown Metal Desk Co., Jamestown, N. Y.

RUBBER TILE PRODUCTS

Rubber floor tile, cove bases, integral-nosing, one-piece stair treads and rubber paving blocks for heavy traffic are the products which are described and illustrated by the Wright Rubber Products Co. Two pages are devoted to the range of color effects which are produced in the manufacture of these products. 5 pp. Wright Rubber Products Co., Racine, Wis.

LINOLEUM PRODUCTS

A complete line of linoleums consisting of battleship, plain, Jaspe, straight-line inlaid, embossed, Karneau marbled inlaid, moulded inlaid, granite, etc. and cork carpet are fully described and illustrated in both scale details and color by the Congoleum-Nairn Inc. Specification illustrated with details of construction form an interesting feature of this catalogue. 15 pp. Congoleum-Nairn Inc., Kearny N. J.

STEEL ROOF SHEATHING, STEEL GRATINGS, STEEL ARMORING FOR CEMENT FLOORS

The Blaw-Knox Company catalogues consist of 9 pages in 3 sections. Six pages are devoted to designing and installation data relating to galvanized steel roof sheathing, 2 pages of which are detail drawings showing various roof constructions. Two pages on electro-forged steel gratings for floors and steps and one page on steel armoring for cement floors and pavements give complete engineering data. 9 pp. Blaw-Knox Company, Pittsburgh, Pa.

BRONZE DOORS, ORNAMENTAL BRONZE WORK, ROLLED STEEL WINDOWS, STORE FRONTS, METAL GRILLES

The Newman Manufacturing Co. are represented in SWEET'S ARCHITECTURAL CATALOGUE File on 38 pages in 5 sections or classification. This exposition comprises complete catalogue data relating to bronze, aluminum, and monel metal doors and enclosures; ornamental bronze and brass work; double hung and casement metal windows; store fronts; metal grilles. 38 pp. The Newman Manufacturing Co., Cincinnati, O.

STEEL ROLLING DOORS

Rolling steel doors and shutters, rolling doors for roundhouses, wood rolling doors and partitions, wood and steel bi-folding doors and vertical sliding doors are presented in Sweet's File by the Kinnear Manufacturing Co. 9 pp. Kinnear Manufacturing Co., Columbus, Ohio.

HOLLOW METAL DOORS AND TRIM, STEEL AND BRONZE INTERIOR EQUIPMENT

Twelve pages in two sections provide a condensed catalogue of the Art Metal Construction Company's products. Eight pages are devoted to general descriptions and details of hollow metal doors and trim and 4 pages to steel and bronze equipment for banks, libraries, public buildings, etc. 12 pp. Art Metal Construction Co., Jamestown, N. Y.

(Continued on page 202)

A modern Convenience Feature which many Architects include in their Plans for Residences

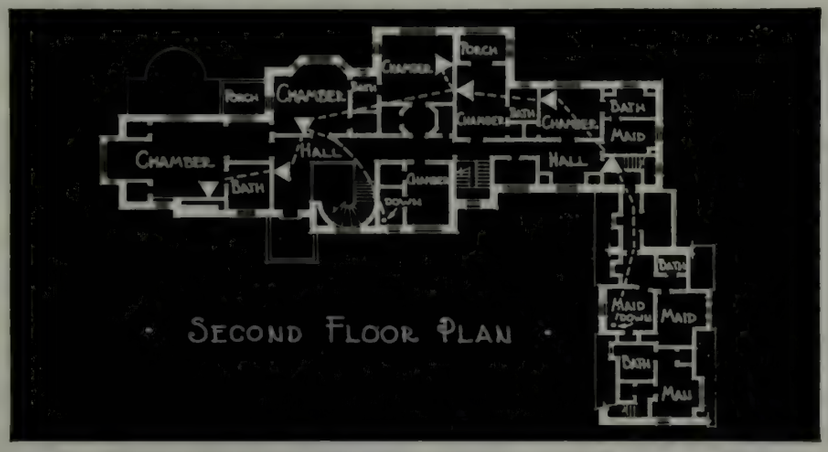
In providing for conveniences in new and remodelled residences, many architects today include facilities for telephone service as a matter of course. They realize that their clients will want telephones wherever they will add to ease and comfort . . . and that the best time to determine these locations is when the residence is being planned. Conduit can then be laid within the walls during construction—giving the improved appearance that comes from concealed wiring.

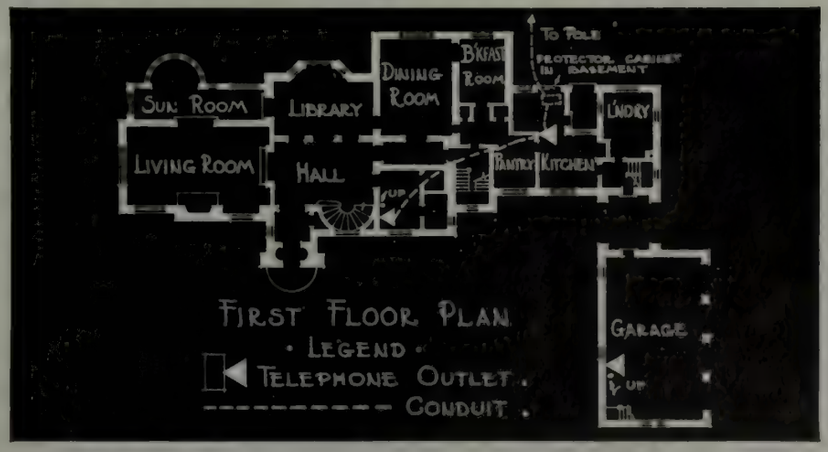
Many home owners want telephone outlets made available in all parts of the house . . . even in places where they do not want telephones immediately. This gives a desirable flexibility, allowing the service to be rearranged or expanded with little trouble.

Representatives of your local Bell Company will be glad to confer with you and your clients in planning for telephone arrangements. No charge is made. Just call the Business Office.



In the above residence at West Brentmoor Park, St. Louis, Mo., ten telephone outlets, including one in the servants' quarters and one in the garage, provide for telephone convenience. Maritz and Young, Inc., Architects, *St. Louis.*





Grilles



Send for the first Complete Handbook ever prepared

HERE is the latest word on Grille design. It is a complete handbook, packed with detail.

Every Architect will want to have a copy in his files to refer to whenever the question of grilles for any purpose comes up.

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Send me.....copies of your latest Handbook on grilles.

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CATALOGUES IN SWEET'S FOR 1930—Continued

CONCRETE ROOFING TILE

Structural details and lay-outs and descriptions and illustrations of concrete roofing tile are included in 7 page catalogue of the Hawthorne Roofing Tile Co. 7 pp. Hawthorne Roofing Tile Co., Chicago, Ill.

STEEL WINDOWS AND DOORS

The William Bayley Co. are represented in Sweet's File on 12 pages. Their steel window and door products are described and illustrated. Each type of window is depicted with detail drawings and diagrams of stock sizes. 12 pp. The William Bayley Co., Springfield, O.

CEMENT PRODUCTS

The Medusa Portland Cement Company present four catalogues under separate classifications. The catalogue relating to plan and waterproofed cement consists of data and specifications covering the proper use of cement in concrete work and masonry construction. One section each is devoted to masonry cement, integral waterproofing, and portland cement paint. 7 pp. Medusa Portland Cement Company, Cleveland, Ohio.

WELDED WIRE FABRIC, WIRE LATH, CHAIN LINK FENCES AND METAL GRILLES

The Wickwire Spencer Steel Company take 10 pages in 4 sections to describe their products. Four pages are devoted to electrically welded wire fabric for use in concrete reinforcement. Complete engineering data as relating to various concrete floor slab constructions is included. The 4 pages devoted to metal lath give descriptions, details and specifications of this material. One page each is devoted to chain link fences and metal grilles. 10 pp. Wickwire Spencer Steel Company, New York, N. Y.

ROOF DECKS, SHEET METAL, SKYLIGHTS, VENTILATORS

The H. H. Robertson Co. require 20 pages in 4 sections for the exposition of their products. Three pages are devoted to the complete description and illustration of protected steel roof decks and V-beam roofing; 9 pages to protected metal roofing, siding and flashings; 6 pages to skylights and side wall sash; 2 pages to roof ventilators. 20 pp. H. H. Robertson Company, Pittsburgh, Pa.

ELEVATOR AND DUMBWAITER DOORS

The Peelle Company devote 7 pages to descriptions, details of construction, underwriter's requirements, and specifications relating to elevator doors. The doors are of the counterbalanced truckable freight elevator type, bi-folding doors and electrical operated doors. One page is devoted to the description of dumbwaiter doors. 8 pp. The Peelle Company, Brooklyn, N. Y.

STEEL STAIRS AND WINDOWS

Ten pages in two sections have been taken in Sweet's File to describe Mesker Bros. Iron Company's products. Two pages are devoted to a general description of steel stair construction and eight pages to rolled steel windows of the casement and pivoted types. Part of the last page illustrates hollow metal windows which are also manufactured by this firm. 10 pp. Mesker Bros. Iron Co., St. Louis, Mo.



CUSTOM-BUILT STORE FRONTS

IN BRONZE, ALUMINUM ALLOY OR COPPER

For excellence of workmanship, true reproduction of design and sound construction we advocate the fabrication of store fronts at our factory. A corps of skilled workmen trained by an institution with twenty-five years' experience in store front building is your assurance of satisfaction. "B" Construction designed along modern lines is now available in the metals mentioned above. Send for Circular on "B" Construction and Full Size Details.

Kawneer
BRONZE
STORE FRONTS



Sash
B-1

THE KAWNEER COMPANY
manufacturers of
BRONZE STORE FRONTS, WINDOWS AND DOORS

SEE OUR CATALOG IN THE 1930 SWEET'S

NILES, MICHIGAN
Subsidiary: BERKELEY, CALIF.

SEE OUR EXHIBIT AT ARCHT'S SAMPLE CORP., NEW YORK CITY

BRANCH OFFICES IN

Atlanta, Ga. Baltimore, Md. Boston, Mass. Buffalo, N. Y. Cleveland, O. Cincinnati, O. Charlotte, N. C. Chicago, Ill. Detroit, Mich. Kansas City, Mo. Louisville, Ky. Memphis, Tenn. Milwaukee, Wis. New Orleans, La. New York, N. Y. Niles, Mich. Omaha, Nebr. Philadelphia, Pa. Pittsburgh, Pa. Utica, N. Y.



Corner Bar
B-2



Water-proof hinge on in-swinging window. (Patents applied for).

Water-proof hinge on in-swinging window. (Patents applied for).

SEALAIR

CAN BE WASHED FROM THE INSIDE

IN-SWINGING SEALAIR Windows can be washed from the INSIDE, thereby reducing expense and lessening the possibility of accidents . . . SEALAIR operates with ease, and is draft-proof when closed . . . The sashes open separately, providing controlled ventilation. Furnished in Bronze, Aluminum Alloy or Steel.

Send for In-swinging Window details and specifications.

THE Kawneer COMPANY
Niles, Mich.
Subsidiary: Berkeley, Calif.

ALSO WEIGHT-HUNG WINDOWS (Light and Heavy) AND CASEMENTS

CLASSIFIED DIRECTORY OF ADVERTISERS

Alphabetical Index to Advertisers, Page 220

After reviewing advertisements in this issue—use Sweet's Architectural Catalogues for 1930 for catalogue and specification information on the products of the most of the manufacturers.

Acid Proof Chemical Stoneware
Knight, Maurice A.

Acoustical Installation—Guastavino, R., Co.

Acoustics
Boston Acoustical Eng. Division of Housing Company
Johns-Manville Corp.

Air Compressors
Westinghouse Traction Brake Co.

Air Conditioner
Airway Electric Appliance Corp.
American Blower Co.
Lewis Corporation

Aluminum
Aluminum Co. of America

Anchors—Concrete
Bulldog Floor Clip Co.

Arc Welding—Lincoln Electric Co.

Architectural Supplies
Higgins, Chas. M., & Co.

Artstone—Rackle, George, & Sons Co.

Asbestos—Johns-Manville Corporation

Baking Machinery
Read Machinery Co.

Balances, Sash—See Sash Balances

Basement, Windows—Steel
Detroit Steel Products Co.
Truscon Steel Company

Bathroom Accessories
Parker Charles Company

Beads—Corner Metal
Milwaukee Corrugating Co.
Truscon Steel Company
Wheeling Corrugating Co.

Beams, Angles, Channels, Etc.
Carnegie Steel Company

Belts
Dayton Rubber Mfg. Co.

Blackboards—Weber Costello Co.

Boiler and Pipe Covering
Johns-Manville Corporation
Ric-wiL Company

Boilers—American Gas Products Co.
American Radiator Co.
Bryan Steam Corp.
Heggie-Simplex Boiler Co.
Smith, H. B., Company, The, Inc.

Bolts—Door—Corbin, P. & F.

Brass and Bronze
See "Ornamental Metal"

Brass and Copper
See "Copper and Brass"

Brick
Finzer Bros. Clay Co.

Bridges—Steel—American Bridge Co.

Builders—Stone & Webster, Inc.

Buildings—Steel
Carnegie Steel Company
Nat'l Assoc. of Flat Rolled Steel Mfrs.

Butts—Corbin, P. & F.
Stanley Works

Cabinet Work—Hyde-Murphy Co.

Cabinets—Kitchen
Circle A Products Corp.
Olean Metal Cabinet Works, Inc.

Cabinets—Medicine—Parker Charles Company

Cabinets—Telephone—Atlas Metal Works

Cabinets—Toilet Paper
Victoria Paper Mills Co.

Cabinets—Radiators
Heintz Mfg. Co.

Casement Operators—Rixson, Oscar C., Company

Casements—Crittall Casement Window Co.
Detroit Steel Products Co.
International Casement Co
Mesker Bros. Iron Company
Truscon Steel Company

Cast Stone
Cast Stone Institute

Cellar Drainer
Penberthy Injector Co.

Cement
Louisville Cement Company
Medusa Portland Cement Co.
Portland Cement Association
Universal Cement

Cement White
Medusa Portland Cement Co.

Chain Sash—American Chain Co., Inc.
Detroit Steel Products Co.
Smith & Egge Mfg. Co.

Chairs
Marble, B. L., Chair Co.

Channels—Carnegie Steel Co.
Concrete Engineering Co.

Church Memorials
American Seating Company

Clamps—Lock Joint
Hyde-Murphy Co.

Clay Vitrified
Clay Products Association

Clocks, Electric
Landis Eng. & Mfg. Co.

Columns, Porches, Etc.
Hartmann-Sanders Co.
Union Metal Mfg. Co.

Compressors—Air
Westinghouse Traction Brake Co.

Concrete Accelerator
Master Builders Co.
Solvay Sales Corp.

Concrete Construction—Reinforced
American Steel & Wire Company
Concrete Engineering Co.
Truscon Steel Company

Concrete Hardener
Master Builders Co.
Sonneborn, L., Sons, Incorporated
Solvay Sales Corp.

Concrete Piling—See Piling—Concrete

Concrete Ready Mixed
Transit Mixers, Inc.

Concrete Surface Treatment
Master Builders Co.
Solvay Sales Corp.

Conduit for Underground Heating Pipes
Ric-wiL Company

Conduits
Fibre Conduit Co.
Fretz-Moon Tube Co.

Conduo-Base
Conduo-Base Co.

Coping Wall
Clay Products Association

Copper and Brass
Baltimore Copper Mills
Revere Copper & Brass, Inc.

Copper Sheets
Baltimore Copper Mills
Revere Copper & Brass, Inc.

Cork Covering
Armstrong Cork & Insulation Co.

Cork Tile Flooring
Armstrong Cork Company, Custom Floors Dept.

Corkboard
Armstrong Cork & Insulation Co.

Covering—Pipe and Boiler
Armstrong Cork & Insulation Co.
Johns-Manville Corporation
Ric-wiL Company

Dishwasher—Conover Company

Door Closers—Corbin, P. & F.
Norton Door Closer Co.
Sargent & Company

Door and Window Frames
Andersen Frame Corp.



WELDED
BRONZE DOORS
«CUSTOM-BUILT»

The versatility of Kawneer Bronze Doors is demonstrated by their use in the Evanston, Illinois, Y. M. C. A. Building, Chester H. Walcott, architect . . . (Natatorium Door shown above). The rails and stiles of all Kawneer doors consist of heavy tubular members, the joints of which are strongly welded.

Send for complete description and F. S. details.

THE Kawneer COMPANY
Niles, Mich.
Subsidiary: Berkeley, Calif.

ALSO SHOWER STALL AND SHOW CASE DOORS



Art Stone Mantelpieces

In All Periods

Specified by foremost Architects because of their richness of texture, beauty of design, lasting durability, and modest cost.

Also Compo Ornaments For Woodwork

Jacobson Mantel & Ornament Company

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- Bayley, William, Company
- Compound & Pyrono Door Co.
- Cornell Iron Works, Inc.
- Dahlstrom Metallic Door Co.
- Detroit Steel Products Co.
- Hamlin, Irving
- Hyde-Murphy Co.
- International Casement Co.
- Kawneer Company
- Kinnear Mfg. Co.
- Peelle Company, The
- Roddis Lumber & Veneer Co.
- Sanymetal Products Co.
- Security Fire Door Co.
- Thorp Fire Proof Door Company
- United Metal Products Co.
- Wheeler-Osgood Co.
- Weis, Henry, Mfg. Co.
- Wilson, J. G., Corp.

Drains
- Crampton-Farley Brass Co.
- Josam Mfg. Co.

Drawing Inks
- Higgins, Chas. M., & Co.

Drives—Cog Belt
- Dayton Rubber & Mfg. Co.

Electric Switches
- Hart & Hegeman Mfg. Co.
- Hubbell Harvey, Inc.

Electrical Equipment
- Adam, Frank, Electric Co.
- American District Tel. Co.
- Bryant Electric Company
- Connecticut Tel. & Elec. Corp.
- Fibre Conduit Co.
- General Electric Company
- Graybar Electric Co.
- Hart & Hegeman Mfg. Co.
- Holtzer-Cabot Electric Co.
- Hubbell Harvey, Inc.
- Imperial Electric Co.
- Lincoln Electric Co.
- Westinghouse Electric & Mfg. Co.

Elevator Doors
- Peelle Company, The
- Security Fire Door Co.
- Tyler Company
- United Metal Products Co.

Elevator Inclosures
- United Metal Products Co.

Elevators
- Otis Elevator Company
- Tyler Company
- Westinghouse Electric Elevator Co.

Enamels
- Du Pont de Nemours, E. I., & Co., Inc.
- Pratt & Lambert, Inc.
- U. S. Gutta Percha Paint Co.

Engineers—Inspection
- Hunt, Robert W., Company

Expanded Casings—Milwaukee Corrugating

Expanded Metal
- Truscon Steel Company

Fence Post—Steel
- American Steel & Wire Co.

Fence—Woven Wood
- DuBois Fence & Garden Co., Inc.
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Fences—American Steel & Wire Co.
- Fiske, J. W., Iron Works

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- Vonnegut Hardware Company

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- Covert H. W., Co.

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- Cornell Iron Works, Inc.
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- Detroit Steel Products Co.
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- Mesker Bros. Iron Company
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- Thorp Fire Proof Door Company
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AMERICAN business men have long realized the extravagance of noise. Now they are doing something about it. Their demand for quiet offices makes sound correction a renting asset no architect or owner can afford to overlook.

Acoustex does more than take care of the noise. It provides an attractive ceiling finish which never wearies the eye. Its textured surface invites the closest inspection with confidence. It has been tested by years of successful installations.

BOSTON ACOUSTICAL ENGINEERING DIVISION
of HOUSING COMPANY
40 CENTRAL STREET, BOSTON, MASS.

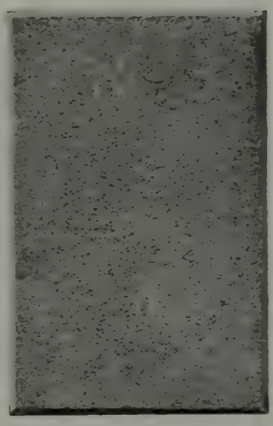
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The *Decorative* Sound Absorbent

ACOUSTEX offers you . . .

An acoustic material which is a finish beautiful in itself . . . tinted to your specifications . . . unusually high coefficient of sound absorption . . . easily vacuum cleaned and redecorated . . . made of incombustible wood fibre . . . tested through years of successful installations . . . furnished in tiles from 6" x 12" to 12" x 24" and large sheets two feet wide and up to ten feet in length . . . three thicknesses available to meet all absorption requirements:



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*Absorbs more than 60% of the incident sound

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*1024 vibrations per second.

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Hamlin sound-proof doors and folding partitions are the accepted standard of leading architects. They are artistically designed to meet modern needs and furnished in finishes to match the woodwork and furnishings of any modern office. They are always air-tight when closed, being heavily felt-filled and impervious to sound. They deaden vibration, and also keep out dust, odors, light and draft. Suitable for office buildings, hospitals, clubs, homes, studios, broadcasting purposes, "talkies", theatres, etc.

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HAMLIN
SOUND-PROOF DOORS
and folding partitions



The New Civic Opera, Chicago, uses Hamlin Sound-Proof Doors.
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Floor Plates—Alan Wood Steel Co.

Flooring
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Armstrong Cork Co. (Flooring Division)
Carter Bloxonend Flooring Co.
Cellized Oak Flooring Co.
Congoleum-Nairn Co.
Master Builders Co.
Norton Company
Oak Flooring Mfrs. Assoc. of U. S.
Stedman Rubber Flooring
Structural Gypsum Corp.
Wright Rubber Products Co.
Zenitherm Company, Inc.

Flooring—Composition
Congoleum-Nairn Co.
Zenitherm Company, Inc.

Flooring—Engineers and Contractors
Bonded Floors Co.

Flooring—Wood Block—Builtup
Carter Bloxonend Flooring Co.

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Footlights—Kliegl Bros.

Fountains—Drinking
Century Brass Works, Inc.
Rundle-Spence Mfg. Co.
Taylor, Halsey W.

Furniture—American Seating Co.
Leopold Company, The
Marble, B. L., Chair Co.

Garage Engineers—Ramp Buildings Corp.

Garage Hardware—Corbin, P. & F.

Garden Furniture and Ornaments
Hartmann-Sanders Company

Gas Boilers—American Gas Products Co.
American Radiator Co.
Bryant Heater & Mfg. Co.

Gas Ranges—American Stove Company

Glass—Window
Adamston Flat Glass Co.
American Window Glass Co.
Pittsburgh Plate Glass Co.

Glass Wire—See Wire Glass

Granite—Bates Bros. Seam Face Granite, Inc.
National Bldg. Granite Quarries Assn.
Woodbury Granite Co., Inc.

Greenhouses—King Construction Co.

Grilles—Wickwire-Spencer Steel Co.

Gypsum Plaster—See Plaster, Gypsum

Gypsum Slabs—Structural Gypsum Corp.
Atlantic Gypsum Products

Hardware—Corbin, P. & F.
Norwalk Lock Co.
Rixson, Oscar C., Company
Russell & Erwin Mfg. Co.
Sargent & Company
Soss Manufacturing Company
Stanley Works
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Weis, Henry, Mfg. Co.
Yale & Towne Mfg. Co.



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Rochester, Minnesota

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And comparable with other important considerations of construction was the tubular material. Again, as in many of America's finest buildings, NATIONAL Pipe was the choice for the major tonnage . . . a choice consistent with its reputation as—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

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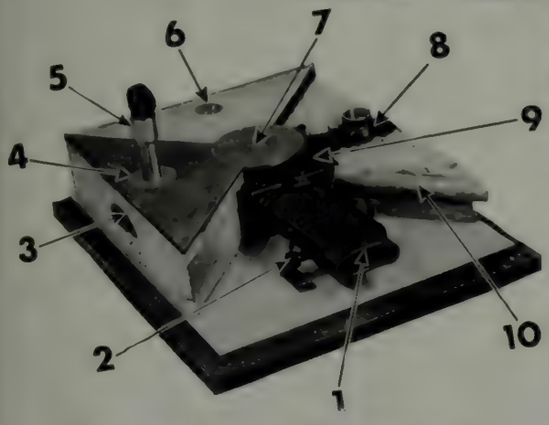
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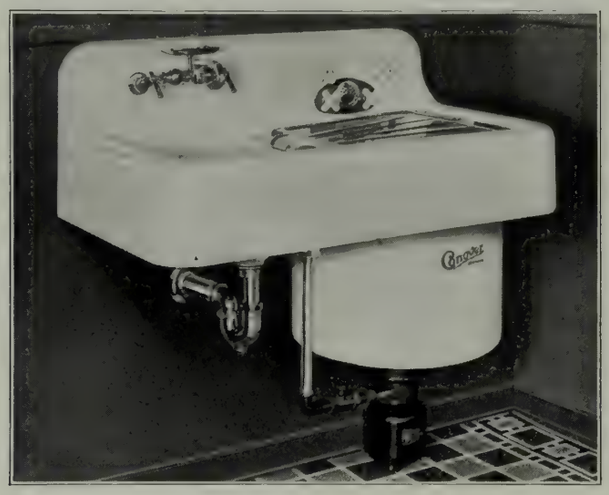
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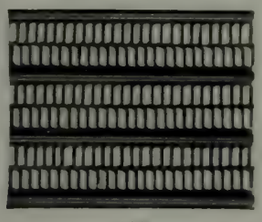
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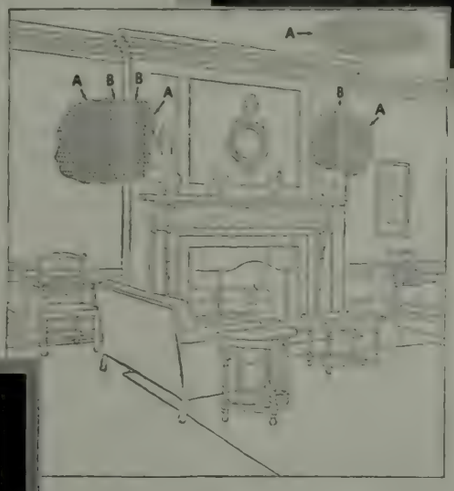
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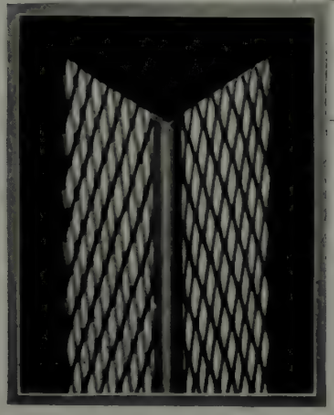


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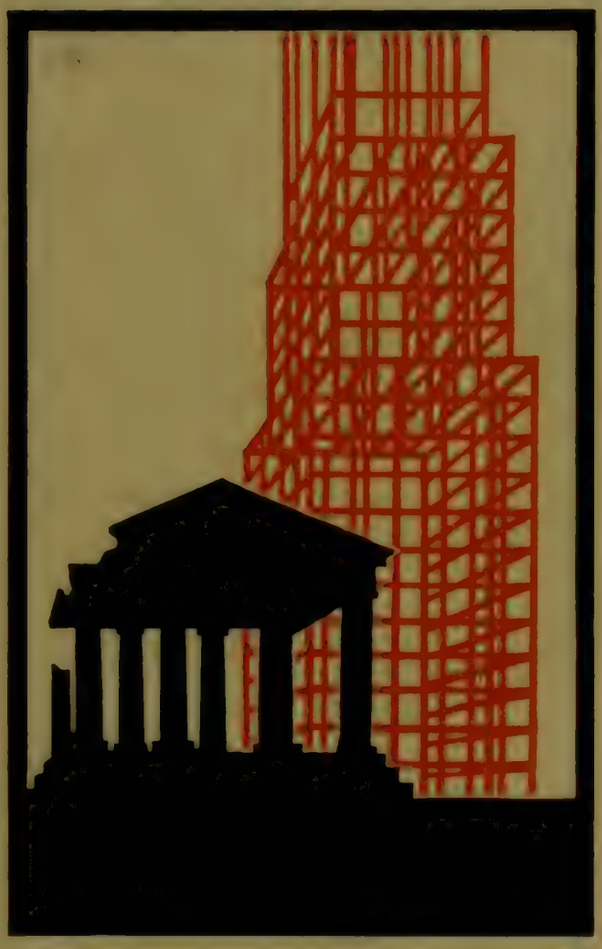
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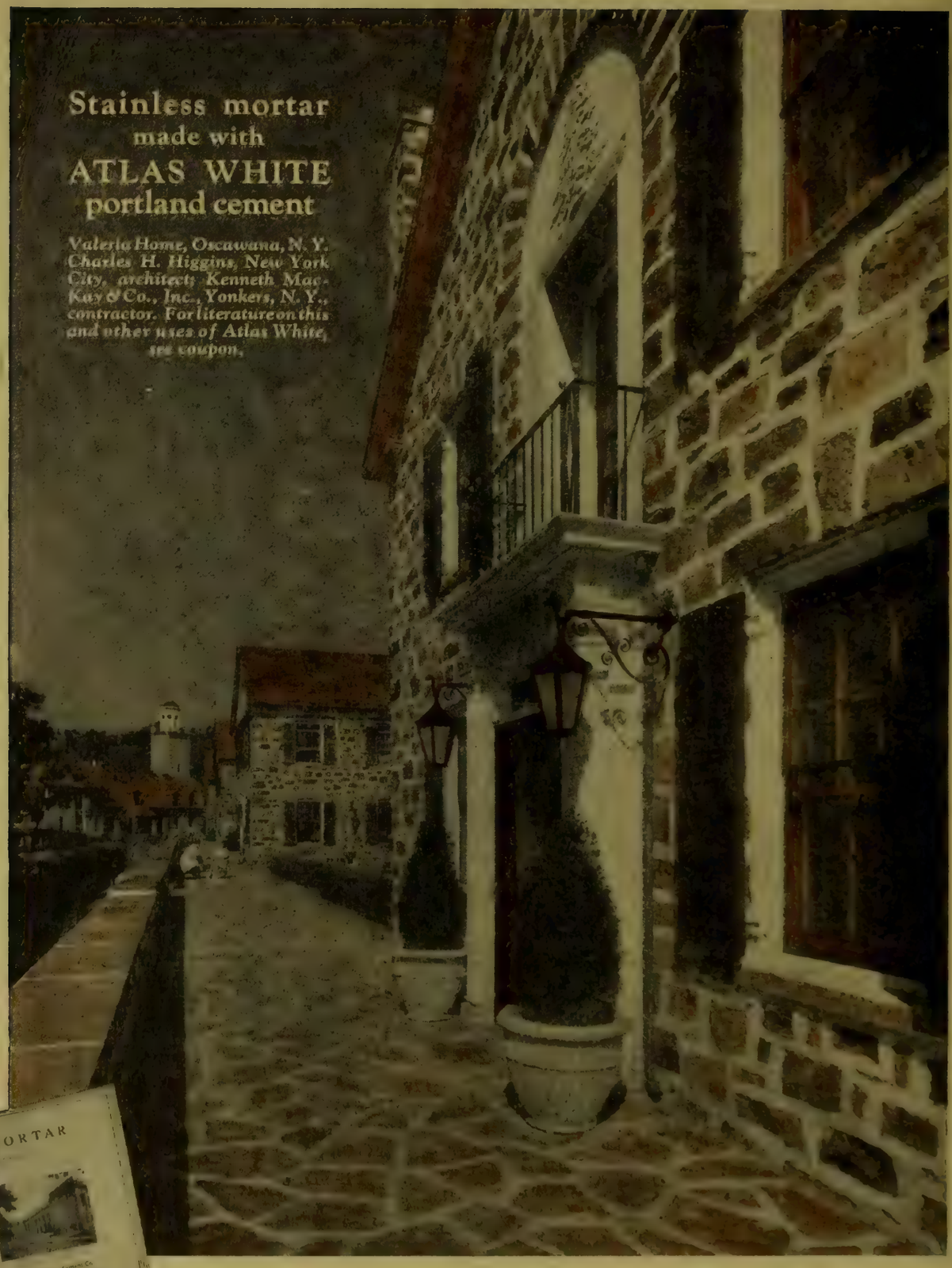
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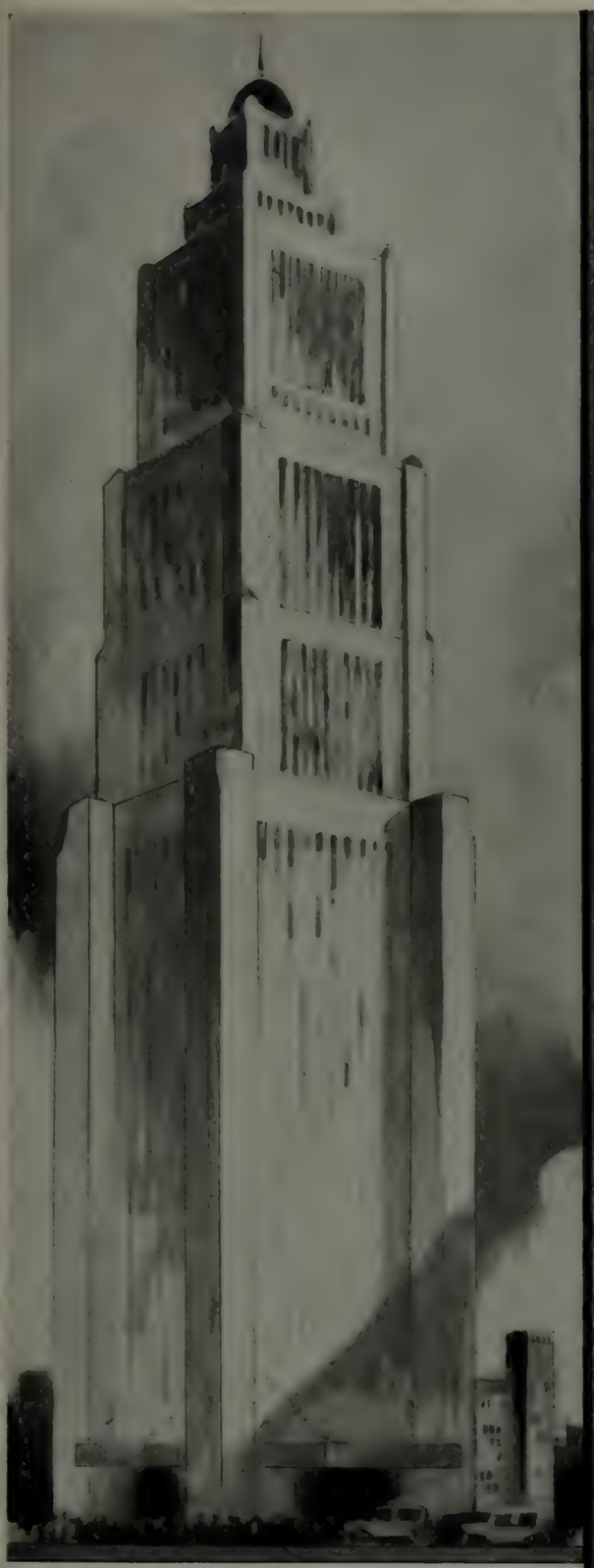
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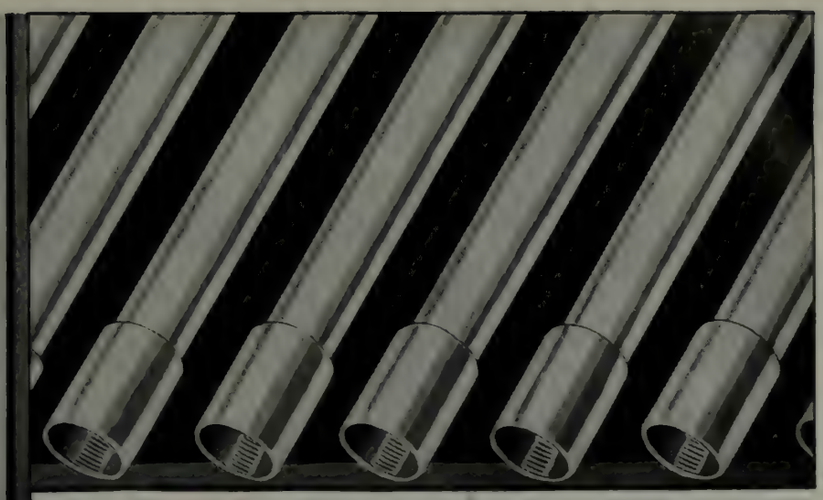
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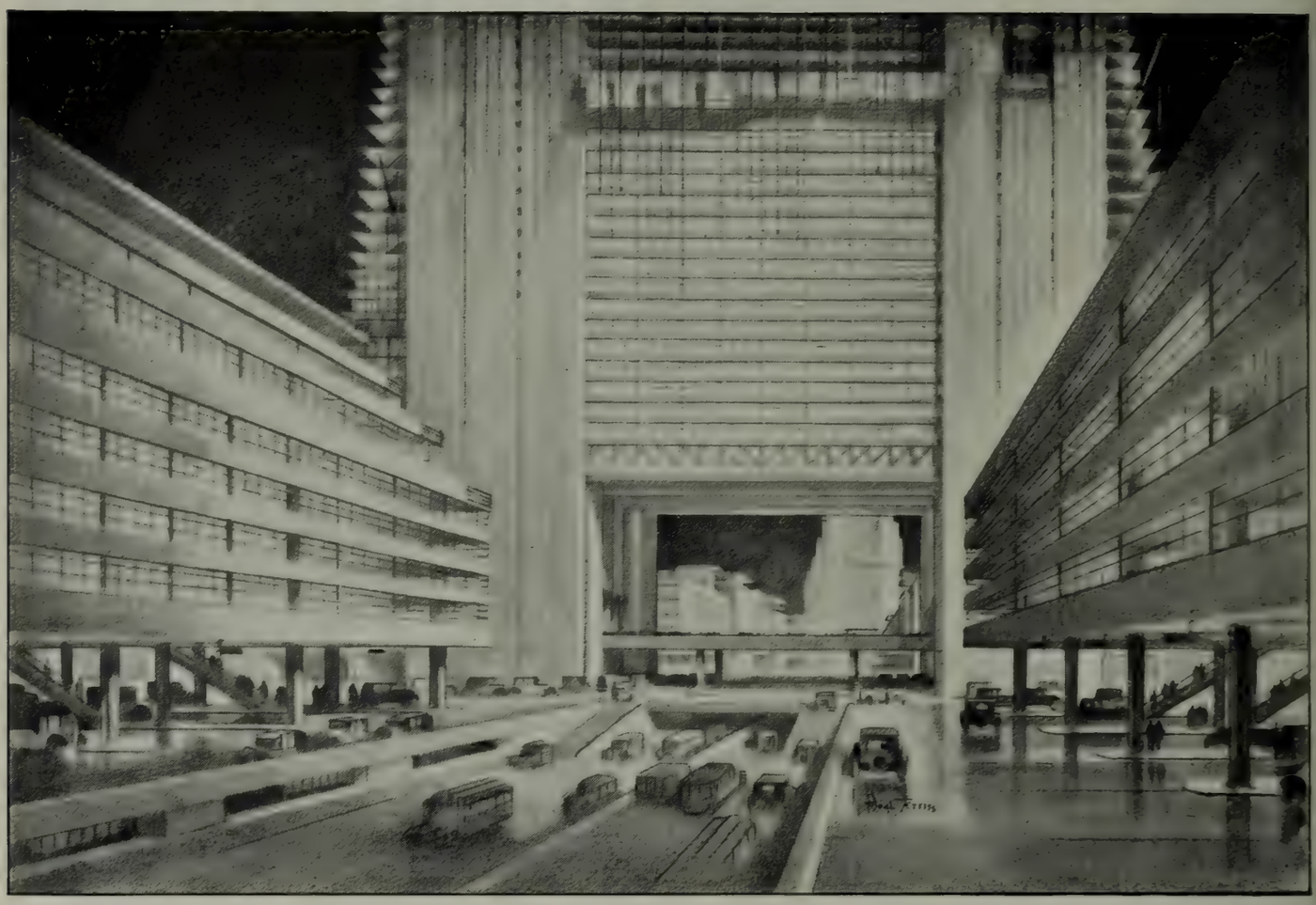
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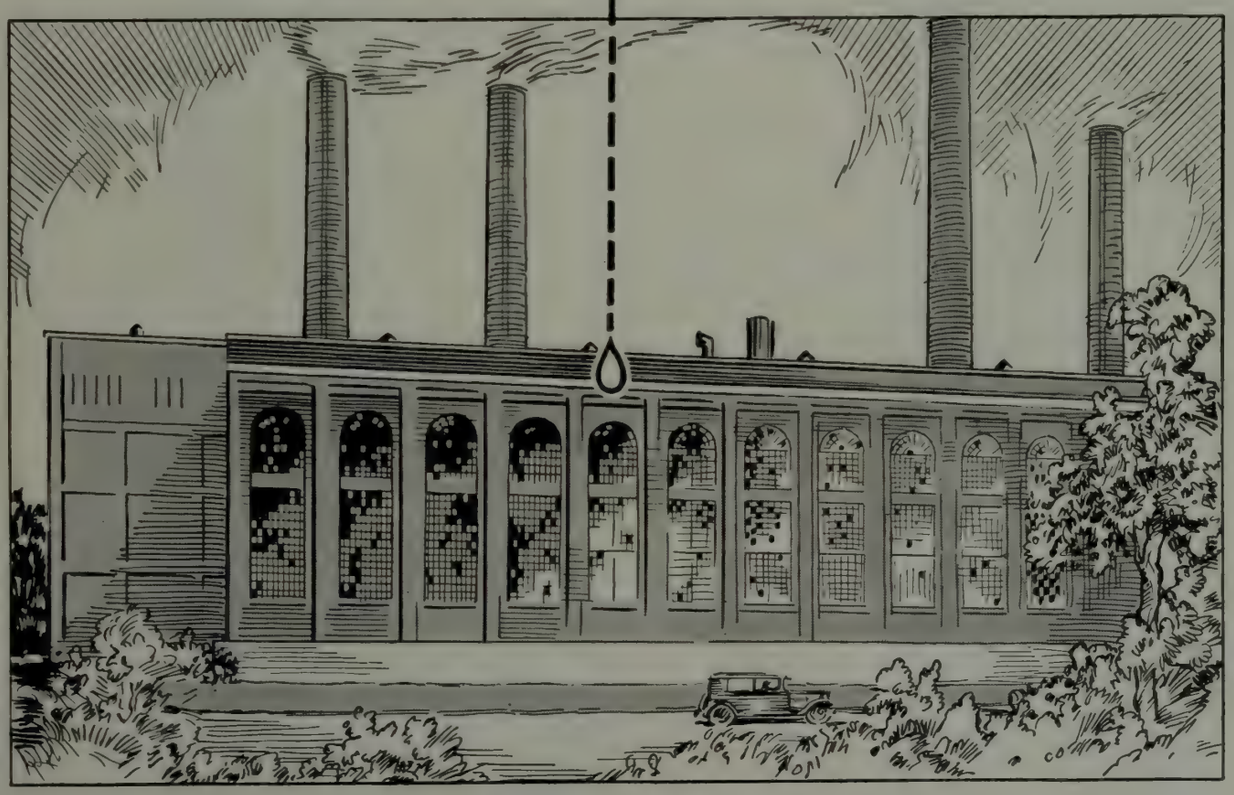
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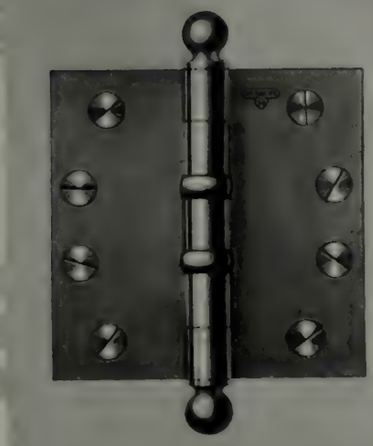
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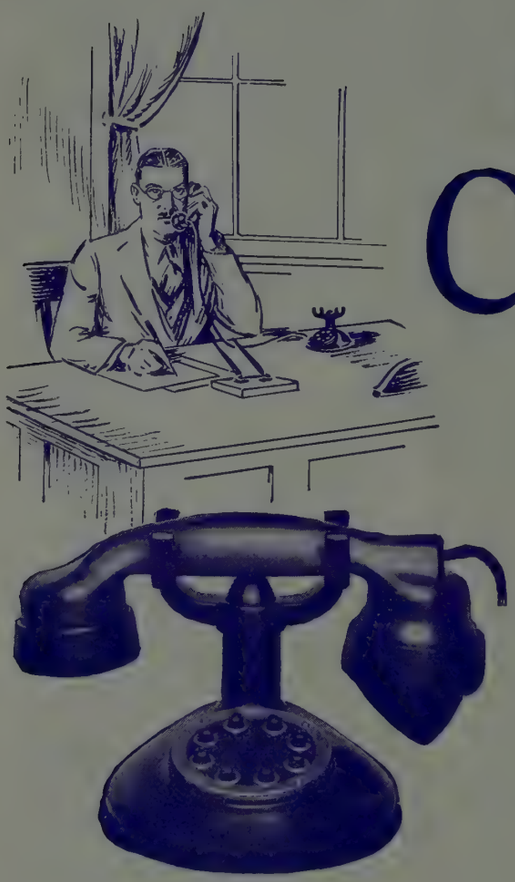
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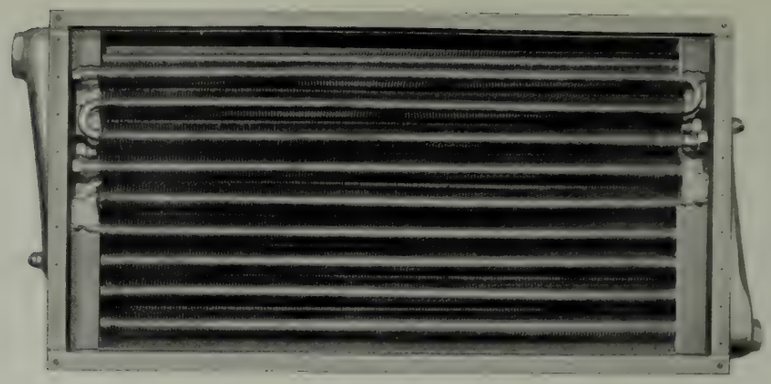
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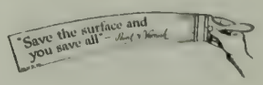
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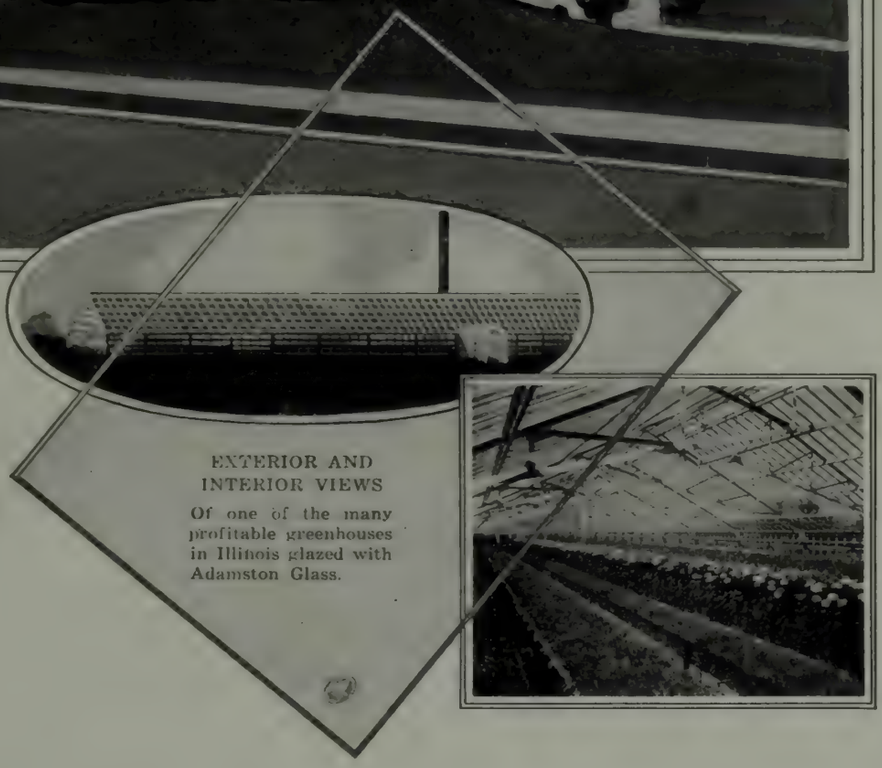
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ADAMSTON FLAT GLASS COMPANY, CLARKSBURG, W. VA.



Taking the radiator out of interior design

You no longer have to struggle with the troublesome design element inherent in old-fashioned bulky radiators. Nor need you compromise with good taste by resorting to makeshift concealments.

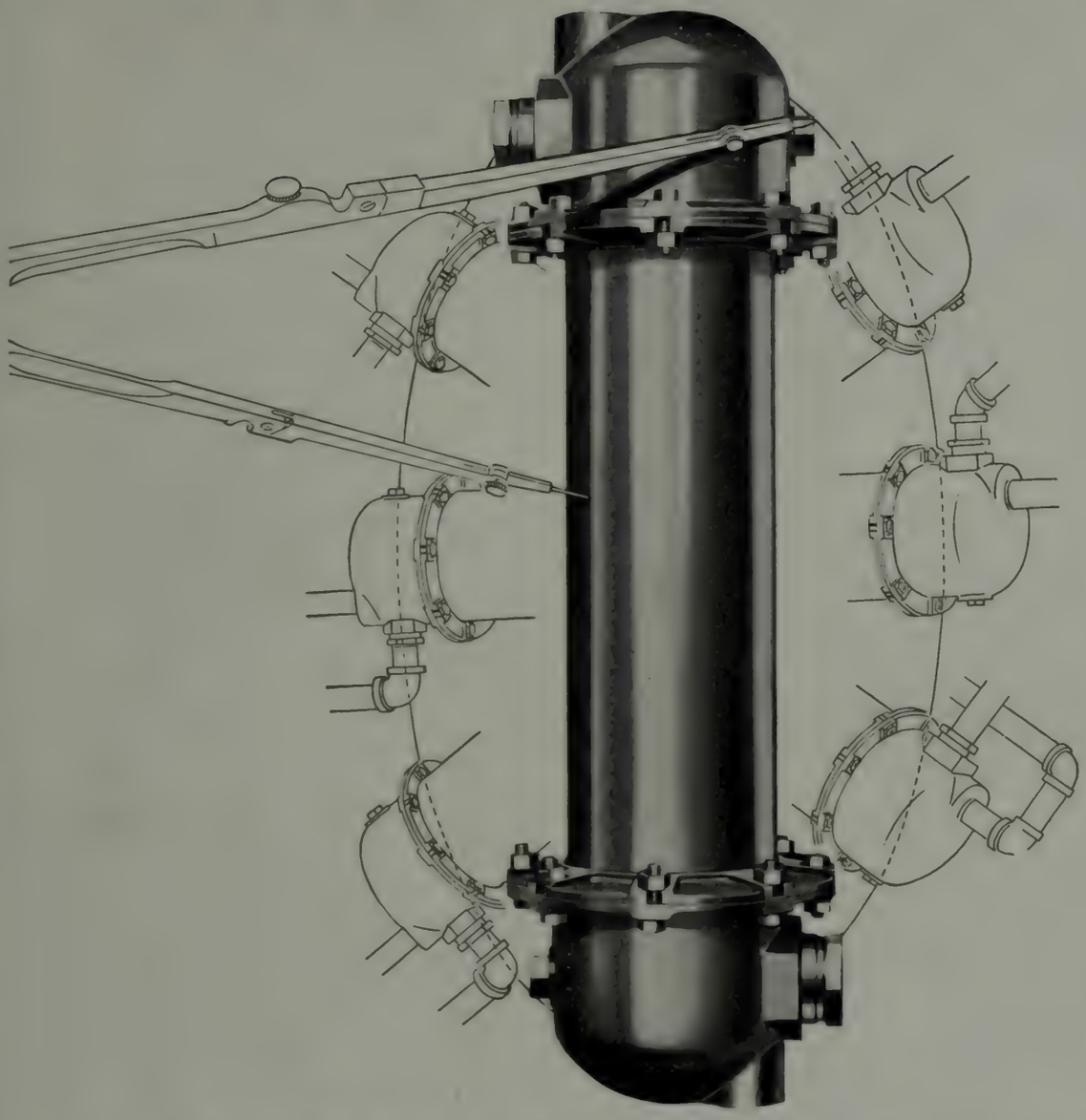
With Robras 20-20 Radiators one may have hidden heat wherever there is "waste space" — four inches or more in depth! In the Rodin Museum pictured above the waste space utilized was under a shelf. In residences it has been found in the sills of French windows, in banks under counters behind tiling and in churches behind wood panelling.

For further notes on these fast-heating, sturdy, electrically-welded brass radiators, turn to Sweet's catalog or your A. I. A. file or call up one of our offices.

ROBRAS 20-20

ROME BRASS RADIATOR CORPORATION, ONE EAST FORTY-SECOND STREET, NEW YORK, N.Y.

I T W O R K S A T A N Y A N G L E



...an ALL-BRASS heater that "goes" anywhere

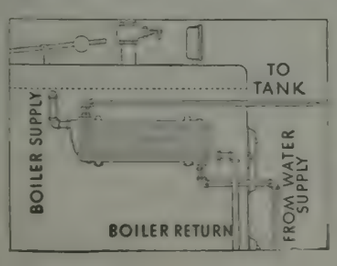
. . . and makes possible these things:

An end to precipitation and subsequent frequent shut-downs for cleaning out sediment.

Installation in either vertical or horizontal positions without friction-producing return.

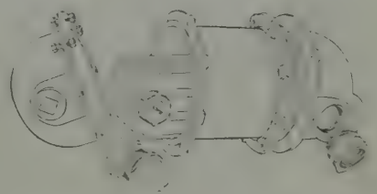
Maximum surface contact in wide stream-lined waterways, for domestic hot water.

Exteriors of waterways in turn designed to form a minimum of resistance to the passage of the heating element.



Consequently, rapid flow of heating elements and rapid transference of heat.

Underlying all of this is the fundamental advantage of this hot water generator. All parts are made of brass. The waterways are made of brass pressed and electrically welded together. The outer shell is highly polished and makes an attractive addition to the boiler room. (The heater can be had with a 6-ply brass covered insulating jacket where desired.) Because there is more water surface in less space Aulbras heaters are smaller and lighter than those with the cast iron shell. Capacities range from 120 to 10,000 gallons with temperature rise of 100° in three hours.



We'll be glad to tell you more. Write us...

AULBRAS

ROME BRASS RADIATOR CORPORATION. ONE EAST FORTY-SECOND STREET, NEW YORK, N.Y.



How appropriate to this Early English residence in Evanston, Illinois, is its roof of hand fashioned shingle tiles. The architect, Richard Powers of Chicago, chose IMPERIAL Roofing Tiles as best simulating the color and texture of ancient English tile roofs.

LUDOWICI-CELADON COMPANY

Makers of IMPERIAL Roofing Tiles

NEW YORK: 565 FIFTH AVENUE — 104 S. MICHIGAN AVENUE, CHICAGO — WASHINGTON: 738 FIFTEENTH ST., N. W.

This Cream-white cedar *makes a good job* of any interior

Architects find Port Orford Cedar one of the most satisfactory woods where a beautiful enameled finish, a deep, rich stain or delicately detailed woodworking is required.

Minutely grained, Port Orford Cedar takes a lasting porcelain-like enamel finish. No grain shows through. Never crinkles or blisters. Requires no unusual priming coat.

A typical example of the sharp, precise detail of Port Orford Cedar woodworking — the living room of the H. W. Bunker residence, Hillsborough, California. Willis Polk & Co., Architects.



Cream-white, easily staining to true, warm walnut and mahogany tones, Port Orford Cedar finish and plywood are selected for trim and panel work in fine homes after the English tradition.

This light, pliable wood works easily. Holds nails with exceptional tenacity. Never splinters, checks, twists or warps. Is free from knots, pitch and rosin. For special designs, it machines easily to sharp, clean-cut edges.

Decay resisting, Port Orford Cedar is an outstanding wood for entrances, porch columns, garden furniture; bulkheading, decking, tunnel lining, boat building. It is ideal for Venetian Blinds, built-ins, etc., as it does not warp.

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The Aristocrat of Woods



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I am interested in Port Orford Cedar. Please send me free, your book "Port Orford Cedar—Its Properties and Uses" also "*Fine Interiors with Port Orford Cedar*" by Wade Pipes, A.I.A.

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Desco Store Fronts, an attractive feature of the H&R Union Store, Dallas, Texas.

Desco METAL REG U.S. PAT OFFICE STORE FRONTS

For Better Display Windows

The impressiveness of his display windows is of first importance to a merchant. Therefore, this factor should be of equal concern to architects and building owners as rental values are directly involved. Many leading architects are assuring "better display windows" by choosing Desco Store Fronts. Furnished in a wide variety of metals, including solid copper (plain or embossed), solid bronze in all standard finishes and chrome nickel aluminum alloy, Desco Store Fronts harmonize with any store window or building design. Of great importance also, Desco Store Fronts are sufficiently flexible to protect the glass against abnormal wind pressure. All told, they make a building a better investment without increasing the initial cost.

For full architectural details see Sweet's catalog. Write us for complete working data and price list. Remember, too, wherever you are there is a distributor near you. We also carry a complete line of "Desco" construction material in our New York City Warehouse.

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DETAIL OF ENTRANCE TO THE R. J. REYNOLDS TOBACCO COMPANY BUILDING, WINSTON-SALEM, NORTH CAROLINA. ORNAMENTAL WORK OF ANACONDA NICKEL SILVER BY THE GENERAL BRONZE COMPANY. SHREVE & LAMB, THE ARCHITECTS, SPECIFIED NICKEL SILVER BECAUSE THE DESIRED EFFECTS COULD BE OBTAINED ONLY WITH THIS METAL

OTHER VIEWS ON
NEXT TWO PAGES

ANACONDA NICKEL SILVER



FOYER OF R. J. REYNOLDS BUILDING. DETAIL OF DOOR MADE OF ANACONDA NICKEL SILVER BY THE GENERAL BRONZE COMPANY. SHREVE & LAMB, ARCHITECTS

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ANACONDA
from mine to consumer

ANACONDA



FOYER OF R. J. REYNOLDS BUILDING. DETAIL OF ELEVATOR DOOR OF ANACONDA NICKEL SILVER FABRICATED BY THE GENERAL BRONZE COMPANY. SHREVE & LAMB, ARCHITECTS

ARE UNIFORM. ANACONDA NICKEL SILVER IN RODS, BARS, SHEETS, DRAWN SHAPES AND CASTING INGOTS MEET ALL REQUIREMENTS OF LEADING FABRICATORS OF ORNAMENTAL WORK. THE AMERICAN BRASS COMPANY, GENERAL OFFICES, WATERBURY, CONN.

NICKEL SILVER

HOW STUBBORN IS PAINT?

"TOO THICK," groans your aching wrist. "Too thick," you echo, as the paint resists your efforts to brush it out. And besides, a too stubborn paint does not yield the best-appearing, longest-lasting film.

Du Pont chemists determined to build into their finishing products the proper consistency, or viscosity. And for testing heavy paints and pastes they adopted the instrument you see here.

Like many other scientific aids in use today in du Pont Laboratories, this device serves two purposes. It helps in the determination of a new paint formula . . . and it serves to keep a constant watch on day-to-day production by providing a check against the accepted standard. This is just one small section of the whole picture of du Pont Pre-testing. If a finishing product does not meet specifications, it fails in du Pont Laboratories or on du Pont testing grounds. It does not fail on the job. Pre-testing is your assurance of constantly maintained high quality hour after hour . . . day after day . . . month after month.

* * *

We invite your inquiry about du Pont paints, varnishes, enamels, Duco, and other finishing products. Our architectural division is equipped to deal intelligently and quickly with special problems regarding application, decorative effects and technique.

Write to Dept. A. R. 5, E. I. du Pont de Nemours & Co., Inc., at any of these addresses: Public Ledger Building, Philadelphia; 2100 Elston Avenue, Chicago; Everett Station No. 49, Boston; 1 Balfour Bldg., 351 California Street, San Francisco.



Gardner-Parks Mobilometer.

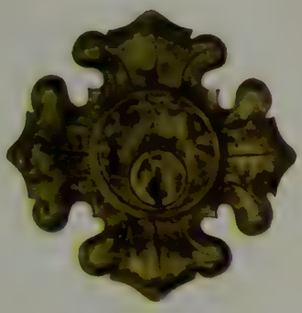
A brass tube—9 inches high and 1½ inches in diameter—is filled with paint to a point ¾ of an inch from the top. A perforated brass disc on the end of a rod is forced through the paint under a known weight. Either the weight needed to force the disc down in a definite period of time is determined, or the length of time for the journey is measured for a specified weight.

DU PONT
REG U.S. PAT OFF.

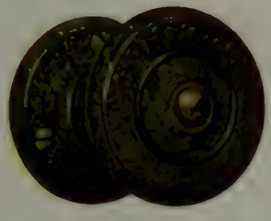
VARNISHES . . ENAMELS . . PAINTS . . DUCO

THE NEW CORBIN POMPEIIAN FINISH





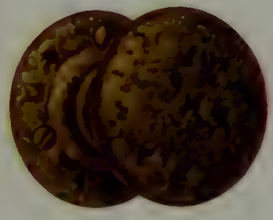




PVB FINISH
(Pompeian, Bronze, Verde Antique)



PHB FINISH
(Pompeian, Light Statuary Bronze)



PLB FINISH
(Pompeian, Dark Statuary Bronze)



PRI FINISH
(Pompeian, Bronze, Rusty Iron)



PVA FINISH
(Pompeian, Brass, Verde Antique)

PT FINISH
(Pompeian, Bronze, Tapestry)

GOOD BUILDINGS DESERVE GOOD HARDWARE

HERE is hardware with a new and strikingly original decorative effect. Corbin has created it by applying a special process to articles of its regular line. The surface is treated to give it a delicate, lacey pattern in flat relief. Both the texture and the rich and often somber color tints are similar to those caused by the corrosive action of air through long periods of time. You will discover many unusual possibilities in this new Corbin Pompeiian finish. Ask your secretary to send for a descriptive folder. Keep it handy in your files.

CORBIN

P. & F. CORBIN
DIVISION

NEW BRITAIN
CONNECTICUT, U. S. A.

THE NEW CORBIN POLYCHROME FINISH



POLYCHROME
An Adam Door Pull in Harmonious Colors



A KNOB AND ESCUTCHEON
FOR BUSINESS BUILDINGS



POLYCHROME



KNOB AND ESCUTCHEON OF
MOORISH DESIGN
Colors taken from the Alhambra

GOOD BUILDINGS DESERVE GOOD HARDWARE

THIS new Corbin finish offers striking decorative possibilities. The treatment brings into relief delicate detail in hardware ornamentation as never before. In heraldic designs actual colors of originals can be applied. The application of color to the depressed portions of the surface permits endless combinations. Any arrangement of colors and shades can be provided — either to conform to colors associated with the decorative period of the design — to harmonize with the color scheme of the decoration of the building — or to provide a brilliant dash of color to relieve monotony of appearance. There is no limit to variations. Write for full details.

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DIVISION

NEW BRITAIN
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TRADE MARK

P&L



100 NORTH LaSALLE STREET BLDG., Chicago. *A. S. Graven, Inc., Architects. J. A. Torstenson & Co., Painting Contractors.*

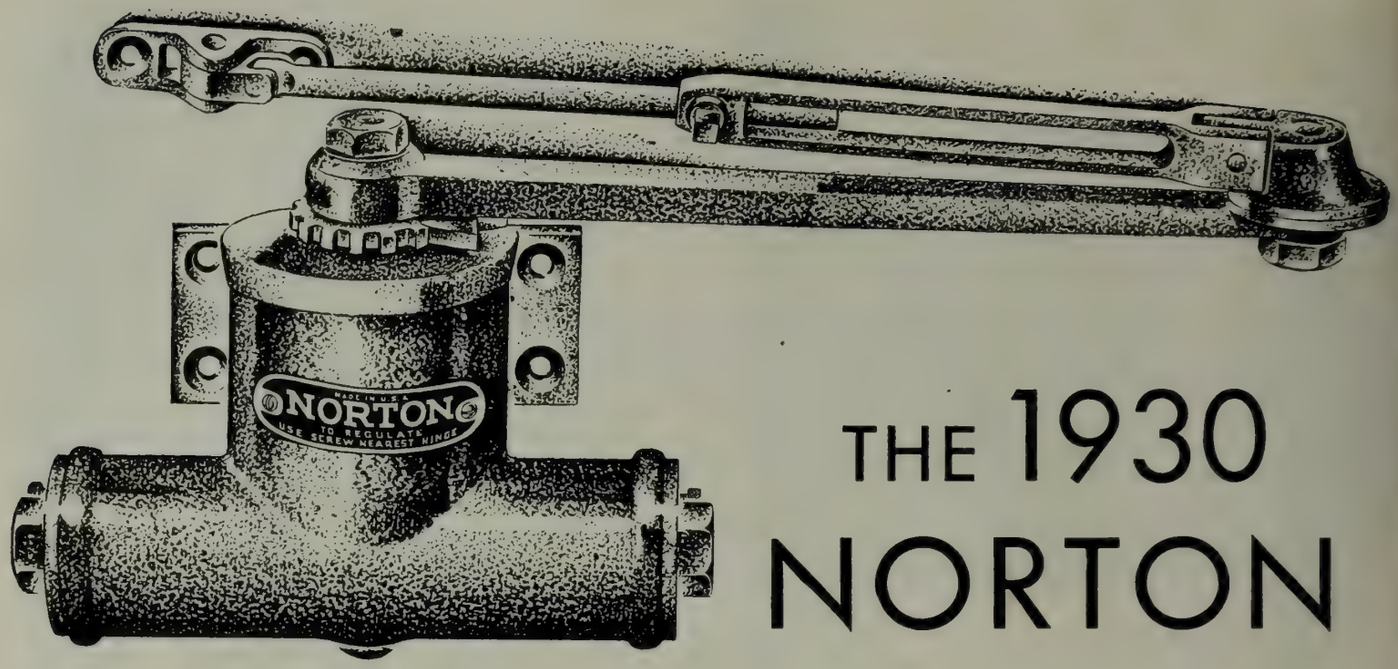
TO insure satisfaction and maximum results in a varnish finish for the interior trim of No. 100 LaSalle Street Building, Chicago, "38" Preservative Varnish was used in preference to others costing less per gallon but more per job. For years "38" retains its original appearance. Painters like it, too. Whether left in its natural rich gloss or rubbed to a satiny dull finish, "38" meets the ideals of both architect and owner.

For technical aid on finishing problems, telephone or write the Pratt & Lambert Architectural Service Department nearest you.

PRATT & LAMBERT-Inc., 108 Tonawanda Street, Buffalo, N. Y. (Phone Delaware 6000); 3301 38th Avenue, Long Island City, N. Y. (Phone Stillwell 5100); 320 West 26th Street, Chicago, Ill. (Phone Victory 1800). In Canada: 28 Courtwright Street, Bridgeburg, Ont.

"Save the surface and you save all" Paint & Varnish

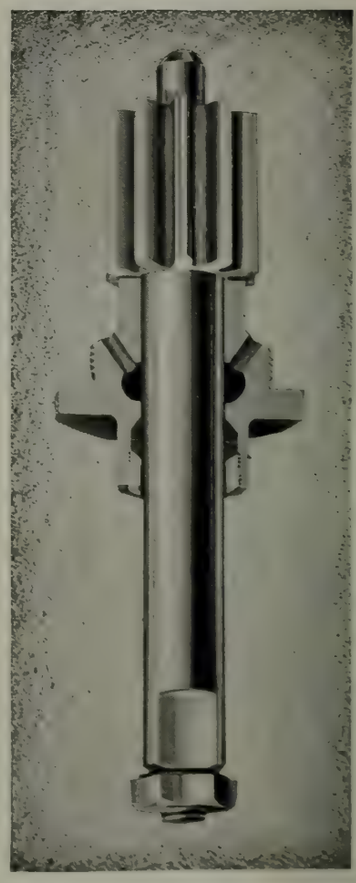
PRATT & LAMBERT VARNISH PRODUCTS



THE 1930 NORTON

with three distinctly important improvements

. a new-type packing nut, perfected in our own research laboratories, which definitely eliminates any possibility of oil leakage. (The figure at the right illustrates how its ingeniously designed recess prevents leakage.) ▲ This decidedly improved packing nut also provides 15% increase in bearing space, which results in a 25% increase in life. ▲ A new spring, of specially tempered steel, is sturdier and more resilient. It greatly increases the efficiency and life of the door closer. ▲ These new improvements mean that the Norton is now more than ever the one door closer to be used where quiet comfort and everlasting dependability are of primary importance.



See Sweet's pages B2408-2412

NORTON DOOR CLOSER COMPANY

Division of The Yale & Towne Mfg. Co.

2900 NORTH WESTERN AVENUE, CHICAGO, ILLINOIS

NORTON DOOR CLOSERS



ADVANCED DESIGN *you expect from the inventors of the first slot outlet and the first Te-Slot outlet . .*



UNIQUE SLOT-FINDERS—New Bakelite face of modernistic design incorporates unique Slot-Finders. A noteworthy convenience. No groping. Blades find their slots automatically, quickly and surely.



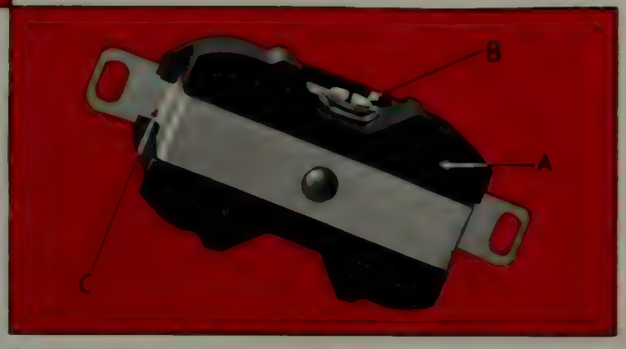
ONE-PIECE CONTACT SPRING—Guarantees perfect alinement and a positive electrical connection. Made of finest phosphor bronze.

EVERY significant advance in convenience outlet design has been pioneered by Hubbell. Back in 1903 the genius of Harvey Hubbell evolved the first flush outlet with slots . . . a contribution of major importance to the whole electrical industry. Fifteen years later Hubbell produced the revolutionary Te-Slot convenience outlet which brought order to the confusion of parallel and tandem blade plugs.

Now Hubbell comes forward with another outstanding development in outlets. Advance showings have brought the enthusiastic approval of architects, engineers, contractors and dealers. All agree that it is a better outlet in every respect!

Check the unique features listed here. See the advanced design incorporated throughout. Send for a sample . . . inspect it carefully and you'll recommend it for future wiring jobs.

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Boston, 176 Federal St.; Atlanta, H. C. Biglin, 138 Marietta St.; New York, 122 E. 42nd St.; Chicago, 318 W. Washington St.; Denver, T. H. Bodfish, 1109 Broadway; Philadelphia, Fifth St., Phila. Bourse (Exhibition Dept.); San Francisco, 390 Fourth St, Garnett, Young & Company. Harvey Hubbell Co. of Canada, Ltd., 7-12 Labatt Ave., Toronto.



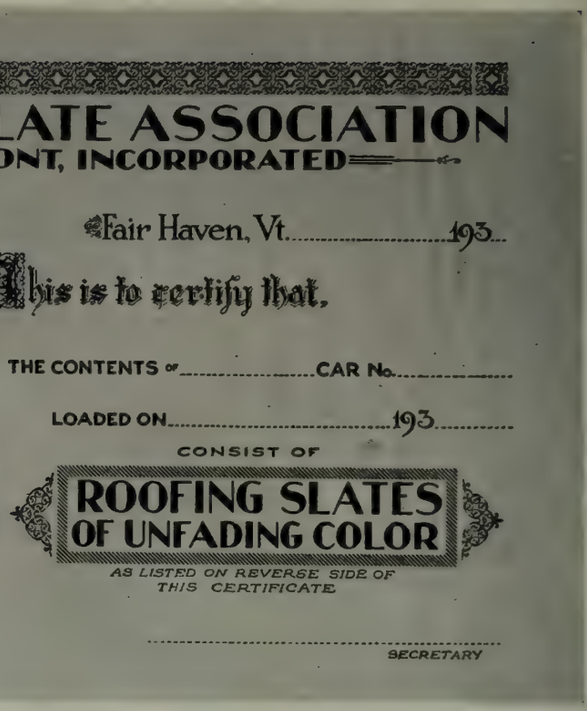
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B—BETTER WIRING AND INSULATING FACILITIES. Larger screws to hold No. 10 wire when desired. Binding plates and screws are in deep pockets with heavy side bosses of composition, well protected and insulated from side of wall and box. Wide Bakelite barriers insulate wiring cavity from face plate. Tapped bushing for plate screw is grounded to mounting strap, thus grounding the plate.

C—MOUNTING STRAP LOCKED TO FACE, for greater strength and rigidity, and more accurate spring alinement.

HUBBELL *convenience* OUTLETS





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Represented in Sweet's Architectural Catalogues, Volume B, Page 1737

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Architect's Service Department, Architect's Building, 101 Park Avenue, New York
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SQUARE FEET

of Concrete Floor Area Formed with Meyer Steelforms

Let your imagination play with these:

A thousand ten-story buildings 100 x 100 ft. square.

A skyscraper 10,000 stories high of the same dimensions.

A concrete floor 20 ft. wide running from New York to Chicago.

. . . Then realize that the square footage represented by any one of these examples is no greater than the 100,000,000 square feet of concrete floor area formed with Meyer Steelforms.

EIGHTEEN years ago, when buildings still cast modest shadows upon the horizon, and before they towered to scrape the sky, the Meyer Steelform method of concrete joist floor construction was presented to the building public.

Today such splendid examples of modern architecture as the Merchandise Mart, Chicago . . . Fisher Building, Detroit . . Foshay Tower, Minneapolis . . . Union Terminal, Cleveland . . . and many others . . . speak volumes for the confidence in which it is held.

That it is a most efficient and most economical building method is demonstrated by the fact that over one hundred million square feet of concrete floor area owe their rigidity and stability to Meyer Steelform construction.

We invite your inquiry for full particulars regarding the adaptability of Meyer Steelforms to all classes of commercial, industrial and residential building.

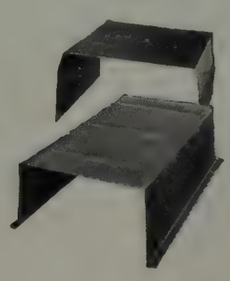
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MEYER *Steelforms*

THE STANDARD



FOR CONCRETE JOIST FLOOR CONSTRUCTION

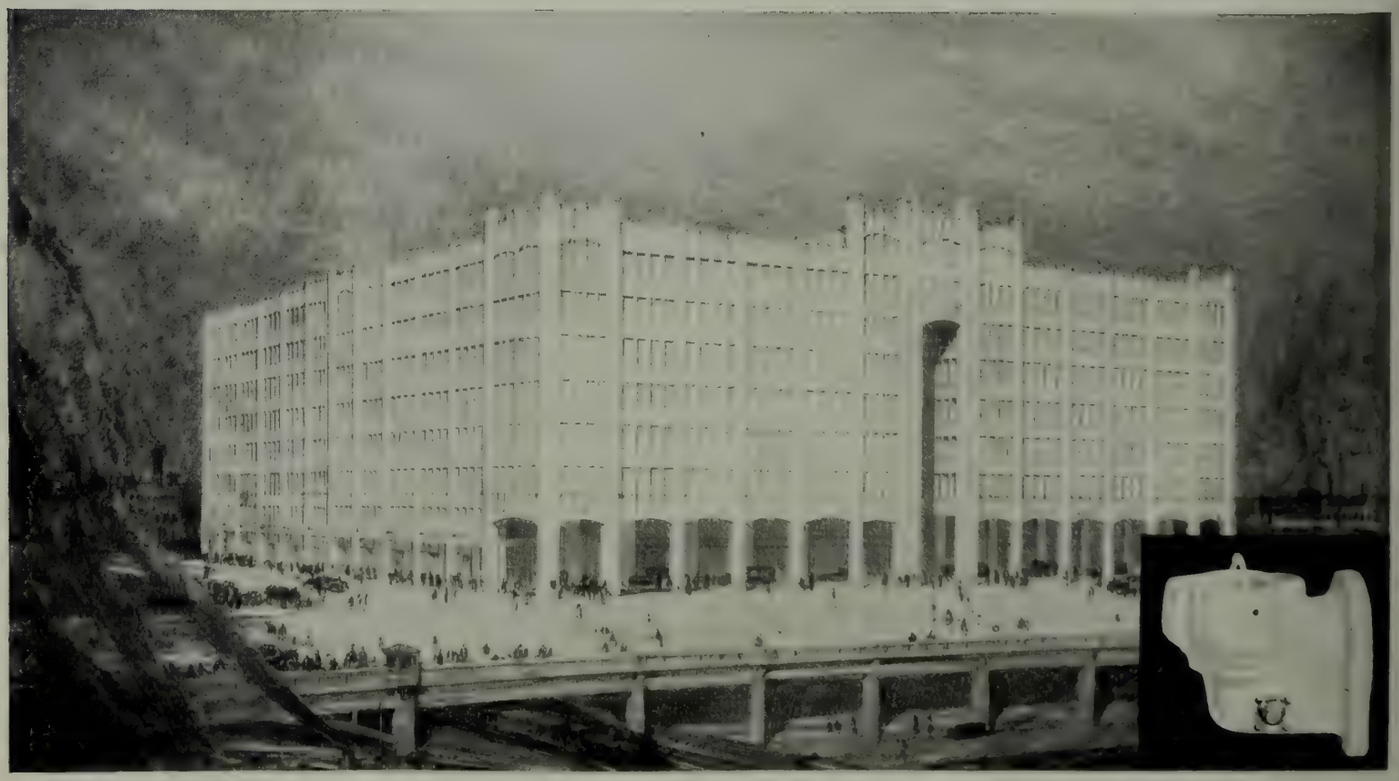


Two-Stream Projector; Practical Automatic Stream Control

Water is never too high, never too low—and always in the bowl, not on the floor. A patented practical automatic control keeps height of stream unvarying regardless of pressure while two-stream projector makes it impractical for lips to touch.

AS DISTINGUISHED AS THE BUILDING . . THESE DISTINCTIVE MODERN FOUNTAINS

FOR this great new Houston (Texas) building, one of many noted structures in the growing Southwest planned by Giesecke & Harris, Architects, sixteen Halsey Taylor Drinking Fountains were installed. The illustration below shows the type used, No. 605 . . . with exclusive patented Halsey Taylor features providing maximum drinking sanitation and convenience as well as a pleasant freedom from servicing troubles . . . See Sweet's, 14 pages, or write us . . . The Halsey Taylor Co., Warren, Ohio.



Merchants & Manufacturers Building, Houston, Texas, Giesecke & Harris, Architects, Hedrick & Gottlieb, Consulting Architects.

. . HALSEY TAYLOR . .
DRINKING FOUNTAINS

"Did Noah have a 'Low Bid' on the Ark?"

OF COURSE he didn't! But suppose he HAD given his contract to the "low man." In light of the character of workmanship and material supplied by a great many low "bidders" of today we hate to picture the plight of Noah and his coterie had he followed the present day practice. Perhaps he MIGHT have "gotten by." On the other hand, tile contractors who use PARDEE tiles sign THEIR contracts with you in perfect confidence . . . they know that the combination of their careful workmanship and the excellent quality of these tiles assures satisfaction to both the architect and the owner.



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THIS COUPON WILL ACT AS A USEFUL MESSENGER

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Kindly send me without cost or obligation:

☐ Catalogue in color.

☐ Color sketch of enclosed area showing how it will look if tiled in Pardee.*

*I enclose (check one) { ☐ sketch of tile area (with dimensions) ☐ blueprint with area indicated.

Color scheme is.....

Name.....

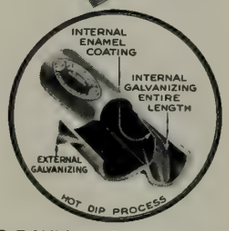
Street.....

City.....

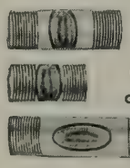
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ELBOWS
Are available in both G-E White and G-E Black.



G-E White—Stripped View



SERVICE NIPPLES
Quantity Production makes the cost low.

CLOSE NIPPLES
They're "Life Savers" for men on rush jobs.



THESE FITTINGS SIMPLIFY INSTALLATION

G-E Rigid Conduit

Guards Electric Service for Five Acres of Offices

Architects, contractors, owners chose materials carefully for this new western giant of commerce—the Exchange Building of Seattle; one of the world's largest concrete structures. Built for *generations* to come.

Electric service lines are carried through thousands of feet of "G-E White," the *hot-dipped galvanized* steel conduit that defies rust.

It is chosen by experts everywhere, not only because it lasts but because wrenches do not scuff off its heavy zinc coating. It bends without cracking and the satin-smooth inside finish aids wire pulling.

The same superior tubing enameled inside and out ... uniformly, every inch ... is "G-E Black." Its enamel is tough and elastic ... withstands abuse.

G-E Rigid Conduit of either type makes wiring *permanent*. You can get it anywhere from G-E Merchandise Distributors—or write Section C-155, Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

RIGID CONDUIT

MERCHANDISE DEPARTMENT • GENERAL ELECTRIC COMPANY • BRIDGEPORT, CONNECTICUT



Hearst Newspapers, (New York Journal and the American) 32,000 square ft. of Bloxonend Flooring. C. E. Birge, architect. Geo. Pancoast, Mechanical Engineer.

From the Atlantic to Half Way Across the Pacific

Leading Publishers are Installing

BLOX-ON-END FLOORING



The Times, Detroit, 13,000 square ft. of Bloxonend Flooring. Albert Kahn, Inc., architects.

In these few representative jobs 154,300 square feet of Bloxonend flooring is demonstrating to publishers that it will capably withstand the great stresses of weight and the vibration of heavy machinery—it will withstand the trucking of forms and the continuous tread of busy workers—and the extremes of atmospheric conditions do not affect it.

Bloxonend cannot splinter and it wears evenly because of its compactness and the fact that the tough end grain is the surface of the floor. Bloxonend floors are easy to keep clean and their resiliency is appreciated by workers.

Many industries besides the publishing, make wide use of Bloxonend flooring. May we send you architectural specifications and a free sample?

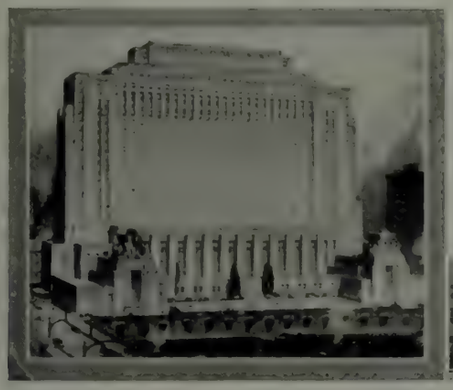
CARTER BLOXONEND FLOORING COMPANY
KANSAS CITY, MO.
Branch Offices in Principal Cities (See Sweet's)



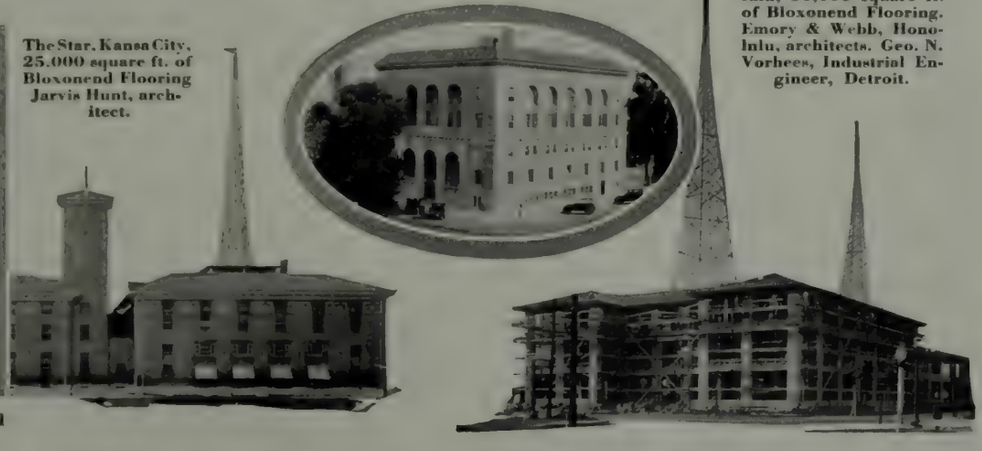
The News, Cleveland, 17,000 square ft. of Bloxonend Flooring. Monks & Johnson, architects and engineers.

The Bee, Fresno, California, 9,300 square feet, Geo. D. Hudnutt, Inc., engineers.

The Advertiser, Honolulu, 36,000 square ft. of Bloxonend Flooring. Emory & Webb, Honolulu, architects. Geo. N. Vorhees, Industrial Engineer, Detroit.

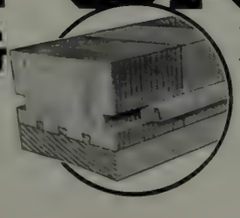


The Star, Kansa City, 25,000 square ft. of Bloxonend Flooring Jarvis Hunt, architect.



Chicago Daily News, 22,000 square ft. of Bloxonend Flooring. Holabird & Root, architects.

BLOX-ON-END FLOORING



Lays Smooth
Stays Smooth

Bloxonend is made of Southern Pine with the tough end grain up. It comes in 8 ft. lengths with the blocks dovetailed endwise onto baseboards.

Leading School Architects specify Bloxonend Floors for Shops and Gymnasiums in the country's best schools.



Zenitherm Walls in
TEMPLE EMANU-EL
Paterson, N. J.
Fred. Wesley Wentworth, Architect
Paterson, N. J.

ZENITHERM for Unusual Architectural Beauty!

THE unusual and distinctive wall treatment of this beautiful Temple owes its architectural charm to Zenitherm's ability to adapt itself to any architectural requirement. Whether for church, office building, hotel, or fine residence, Zenitherm lends a decorative touch that adds immeasurably to the final appearance Zenitherm's twenty-one colors are always available in combinations of full and subdued tones, ranging from the softest of pastel shades to the most vivid of modern contrasts. Zenitherm has the appearance of marble or colored stone. It can be sawed, nailed, and worked like wood. Ideal for *exterior* walls and terraces, too. Age and weathering only serve to add to Zenitherm's durability. For full color charts, see Sweet's Architectural Catalogues, pages B-2286-7-8-9. Or, write us direct for further information.

A. G. H. Dinsdale
PRESIDENT

ZENITHERM
(For Walls and Floors)

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COMPANY, *Inc.*
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Philadelphia, San Francisco,
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ONE BRAND ONLY "BANNER"

When the skill, experience and reputation of a manufacturer are all staked on one brand, the buyer has full assurance that he is getting the best the maker produces.

Banner Finishing Lime is the best and only grade we make or sell. It is famous Ohio dolomite, manufactured with modern machinery and by methods developed over a period of twenty-three years. Banner is bought and used with confidence.

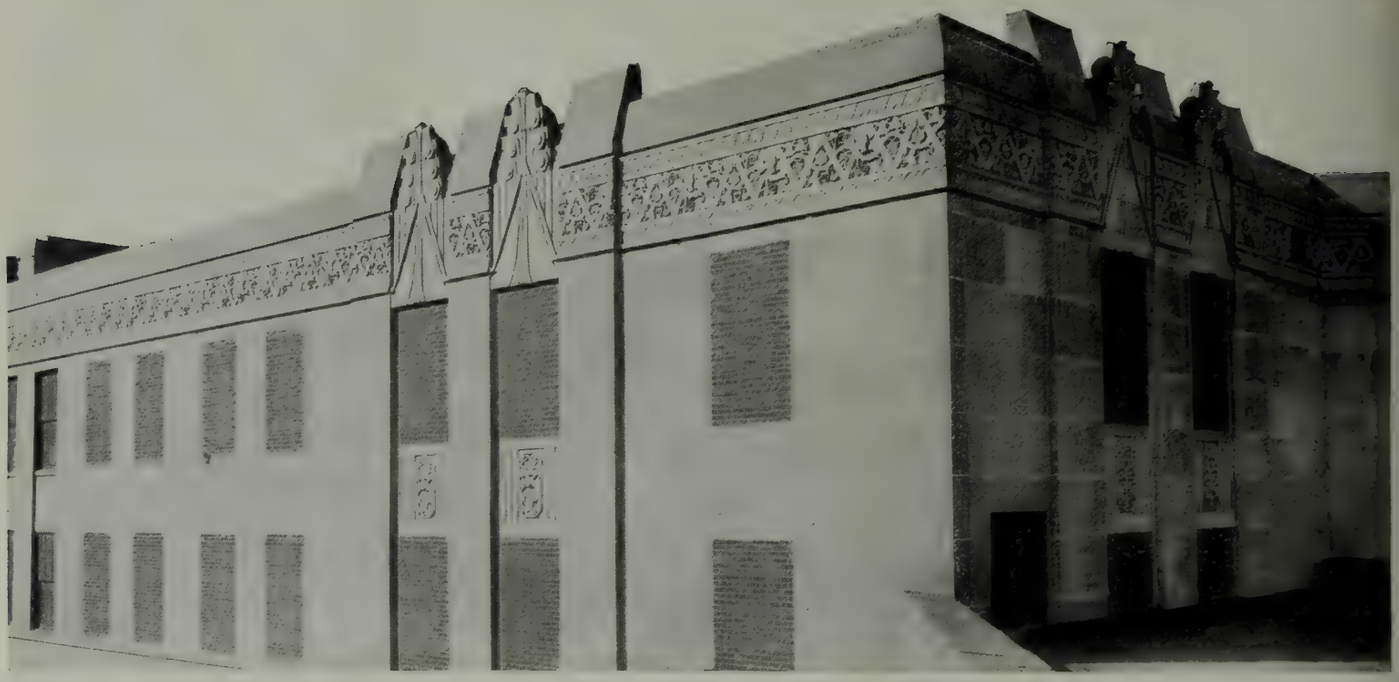
NATIONAL MORTAR & SUPPLY CO., PITTSBURGH
CHARTER MEMBER FINISHING LIME ASSOCIATION OF OHIO



Banner Lime

FAMOUS OHIO FINISH

FEDERAL SEABOARD TERRA COTTA



Details Medical Arts Building, Cleveland, Ohio

Graham, Anderson, Probst & White, Architects
Lundoff-Bicknell Co., Builders



THE three great units of Cleveland's new business center, the Medical Arts, Builders Exchange and Midland Bank Buildings have as their most distinctive architectural feature very delicately detailed modern terra cotta ornamentation.

The facades of the Medical Arts Building, illustrated, are of plain stone ashlar. All decoration, spandrels, lintels, band courses, and ornamental finials are of terra cotta in large units—closely resembling the limestone in color and scale. Where strong vertical lines are required dark multichrome glazed green spandrels are used.

FEDERAL SEABOARD TERRA COTTA CORPORATION

ARCHITECTURAL
TERRA COTTA
MANUFACTURERS

F S T C

OFFICES
10 EAST 40th STREET
NEW YORK CITY
TELEPHONE ASHLAND 1220

FACTORIES: PERTH AMBOY, N. J. • WOODBRIDGE, N. J. • SOUTH AMBOY, N. J.



1242 Lake Shore Drive apartment, Chicago. Architect, Robert S. DeGolyer & Company, Chicago. General Contractor, Turner Construction Company.

Alcoa Aluminum used for spandrels, ornamental balconies, jambs, mullions, heads and sills. The following two pages give details.

ALCOA ALUMINUM
lift 30,000 pounds dead weight

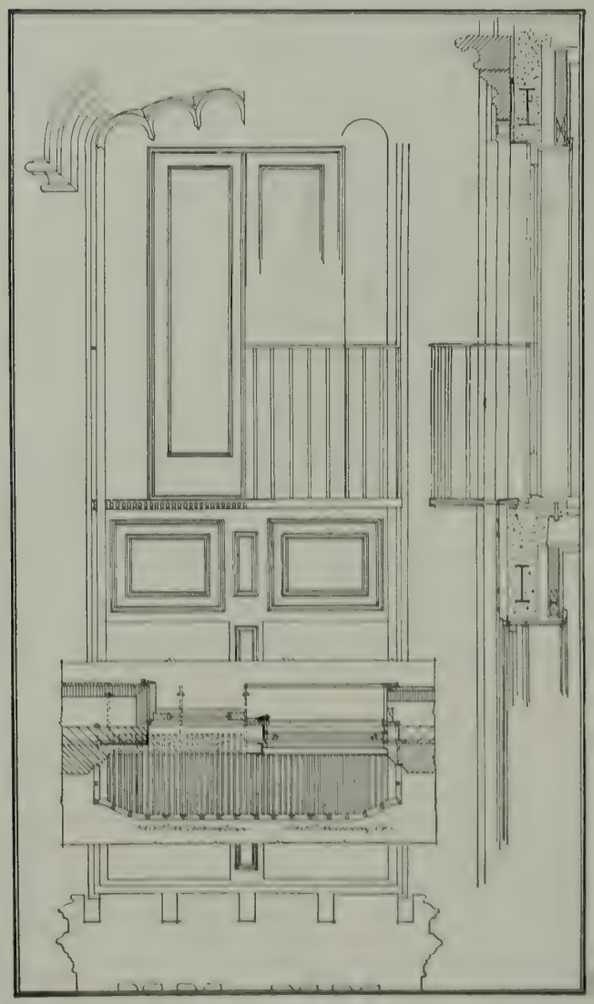
WEIGHT REDUCTION

212 spandrels cast of Alcoa No. 43 Aluminum Alloy were used in this Chicago apartment house. The total weight was just over 15,000 pounds. If bronze or iron spandrels of the same size had been used instead, they would have weighed over 45,000 pounds. Thus there is now 15 tons less weight on the face of the building. 15 tons less on which to pay fabrication, hauling and erection costs.

Two men can easily lift a cast Alcoa Aluminum Alloy Spandrel 5′ x 6′. An identical casting of old-fashioned, heavy metal cannot be moved without additional men and usually a tackle.

In addition to spandrels, Alcoa Aluminum Alloy castings were used on bays for jambs, mullions, head and sills. Ornamental balconies were fabricated entirely of Alcoa Aluminum.

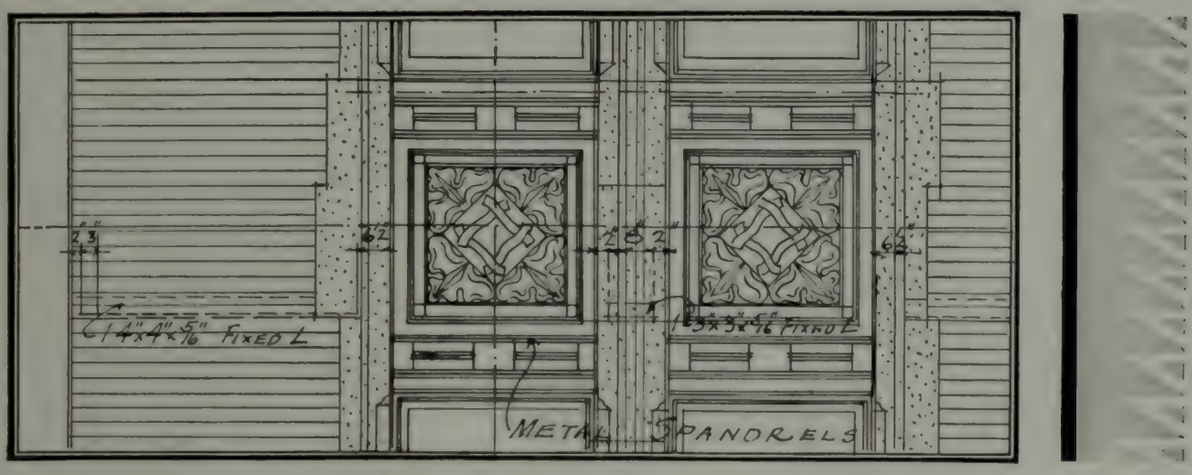


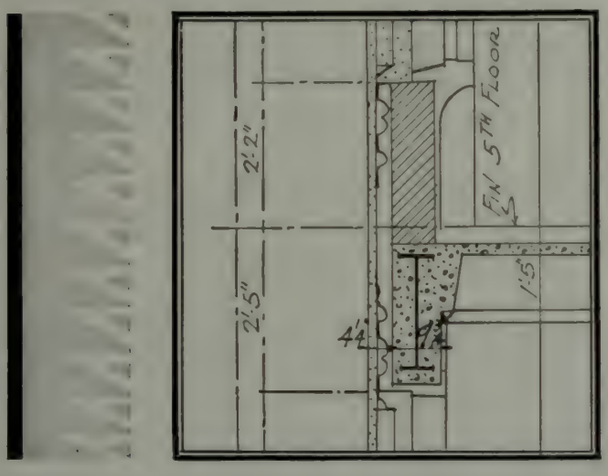


This modern material is unaffected by the weather; requires no painting or coating; will not streak onto adjoining surfaces, and is tough and durable. When you consider the many advantages that Alcoa Aluminum Alloys bring, it is little wonder that they are specified so generally by architects.

May we send you a complimentary copy of "Architectural Aluminum"? It brings you up-to-date on the use of this modern building material. ALUMINUM COMPANY of AMERICA, 2467 Oliver Building, PITTSBURGH, PA.

SPANDRELS
from faces of this apartment house





SPECIFICATIONS

"These aluminum spandrels, sills, and other cast items shall be made of Alcoa No. 43 Alloy, having a silicon content of 5%. The average tensile strength shall be 17,000 lbs. per sq. inch and the average elongation in two inches 5%. The weight shall not exceed .097 lbs. per cubic inch. The surface shall be free from imperfections and in all respects equal to sample submitted."

ALCOA ALUMINUM



Illustrating sharpness of detail in design and absence of cracks--typical of lime plaster. Holy Trinity Church, Kansas City, Mo. Brinkman and Hagen, Architects, Emporia, Kans. W. F. Gosche, Contractor. Harry Walters, Plastering Contractor, Kansas City, Mo.

LIME--For Enduring Excellence in Plaster » » » » » »

EVERY progressive architect is abreast of the recent developments affecting his profession and familiar with the newer specifications resulting from the present trend towards better plastering.

Investors, owners and builders are becoming convinced that permanently unmarred plaster surfaces--such as are found in old Colonial buildings--are possible only through the use of lime in both base and finish plaster coats. As a result of this renewed recognition of the merits of lime, it is being specified more and more for the better class residential, commercial and public buildings throughout the country.



Lime plaster excels in plasticity; hence ample time is allowed for manipulation of each plaster coat before initial set occurs. This property of lime is essential to the best workmanship, inasmuch as it permits the development of true surfaces, clean-cut corners and arrises and sharp detail in cast and run work.

Our new booklet, "Lime--Its Use and Value in Engineering and Building Construction", and our new "Specifications for Lime Plaster" (A.I.A. Document No. 21A1), just off the press, will keenly interest every architect and builder. Write today for your copies.

NATIONAL LIME ASSOCIATION

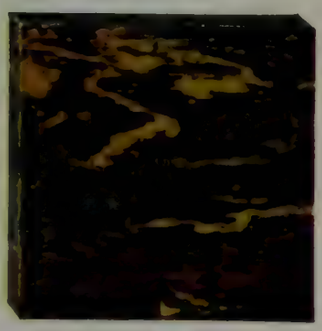
An organization of leading lime manufacturers formed to encourage a better appreciation of the economic value of lime in all its uses.

113-A

713 Phillips Building » WASHINGTON, D.C.

.....make full use of color!

in the Floor. Twenty-seven correct color types in tile, strip and molded forms, afford the widest latitude in design arrangement. Practical floors can now be created to complement the architectural treatment of walls and ceiling—to interpret the motif and purpose of a room. The light gay atmosphere of a beauty salon or tea shop, the grandeur of a rotunda, the quiet dignity of a church—each can be expressed correctly and completely in a quiet and lasting floor of this modern material.



Black Gold Paisley
Black with veinings of Gold and Dark Red

Stedman Reinforced* Rubber Tile

meets modern flooring needs. *Color:* with veinings of unusual fineness and beauty. *Comfort:* quiet under foot, firm yet resilient, smooth but not slippery. And *Economy:* a floor you can depend upon to wear well and look well for many years.

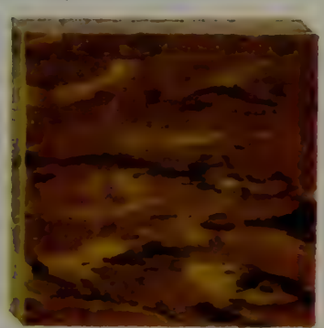
Eight million square feet have already been installed in institutional buildings and private homes.

When you specify Stedman Reinforced Rubber Tile you enlist the services of an organization of specialists, from creation to installation. Full information and color charts sent gladly.

STEDMAN RUBBER FLOORING COMPANY
SOUTH BRAINTREE, MASSACHUSETTS



Black Grey
Black with veining of Grey



Brown Gold Paisley
Brown with veinings of Black and Gold



Design No. 27. An achievement in the ordinarily commonplace diagonal pattern. Predominating color type is Brown Green Paisley; darker squares are Black Green; the narrow border is Buff Black.



Grey



Red Black
Dark Red with veining of Black



Black Gold
Black with veining of Gold



White Black
White with veining of Black

*REINFORCED: In the Stedman Process minute cotton filaments, uniting with the rubber under high pressure and heat, are responsible for its unusual resistance to wear and distention, its lasting resilience and smooth, impervious surface—characterized by color veinings of remarkable fineness and beauty

Hollow Metal Doors by Art Metal

in Detroit's David Stott Building



300

stair and corridor doors. Simple, permanent as the building itself . . . and fire-resisting as well. These are the qualities that led to the selection of Art Metal for the doors and trim in this new 35-story Detroit skyscraper.

210

bi-parting, steel elevator doors. These Art Metal units, while conforming to the character of the architectural design, deliver efficient and lasting service. Elevator banks similar to this one are used in each of the 35 floors. On the first floor six Art Metal cast bronze units add beauty to the lobby.



For more than forty years, Art Metal has been supplying hollow metal and bronze doors, as well as other equipment for office buildings, banks and public buildings throughout the country. The experience gained in these years of service is available to architects and builders. Any contract, regardless of size or diversification, receives competent and expert attention. A letter to us will bring a representative qualified to consult with you on any architectural metal installation. Address your request to the Art Metal Construction Company, Jamestown, New York.

Art Metal

JAMESTOWN - NEW YORK

BRONZE AND STEEL INTERIOR EQUIPMENT
FOR BANKS, LIBRARIES AND PUBLIC BUILDINGS
. . . HOLLOW METAL DOORS AND TRIM



GREAT WESTERN INSURANCE COMPANY BUILDING -- DES MOINES, IOWA

Arthur H. Neuman Co., Contractors

Normile & Emery, Architects

. . . "ROLSCREENS of Pella are a decided improvement in window screens. Their high standard of construction and refinements of operating detail make Rolscreens an asset to fine windows. Our complete confidence in the guarantee is justified by the Rolscreen Company's reputation for integrity.

John Normile

. . . "ROLSCREENS certainly have solved the screen problem for casement windows. On all the jobs where we have used them they have proven very satisfactory."

Anson B Emery

Normile & Emery, in accord with other leading architects of America, find Rolscreens best suited for the screening of fine windows. ✣ ✣ ✣

Rolscreens

TRADE MARK

PELLA IOWA

Rolscreen Representatives in all Principal Cities . . . See Sweets Catalog . . . Volume B Pages B 2742-46



Modern buildings... *need good drinking water*

...refreshing as a mountain stream



Water, as refreshing as this virgin stream, can be brought to public buildings.

It costs very little to supply circulating refrigerated drinking water

TENANTS in modern buildings have a right to expect cool, clean drinking water. That's why the circulating refrigerated drinking water system is so popular. And if the lines and tanks are insulated with Armstrong's Cork Covering, the operating cost is less than for any other satisfactory method of distribution.

Then the water has the refreshing wholesomeness of a virgin stream—healthful, palatable, satisfying. Never warm, never too cold—but constantly maintained at just the right temperature, 45° to 50° F.

Why are these drinking-water advantages attainable at a cost less than for other methods of distribution? Why do surveys show an operating saving of from 30% to 40% over other systems?

This low cost of operation is the result of efficient insulation. Armstrong's Cork Covering keeps the "line loss" so small that a very little refrigeration holds the temperature variation within a few degrees throughout the system. Furthermore, there is practically no depreciation to charge off on insulation. Armstrong's Cork Covering lasts as long as lines with almost negligible expense for repairs and maintenance.

These statements are facts. They have been demonstrated. We suggest that you call upon Armstrong engineers. They'll gladly advise you in the designing of drinking water systems. Armstrong Cork & Insulation Company, 901 Concord Street, Lancaster, Pennsylvania.

Armstrong's Cork Covering

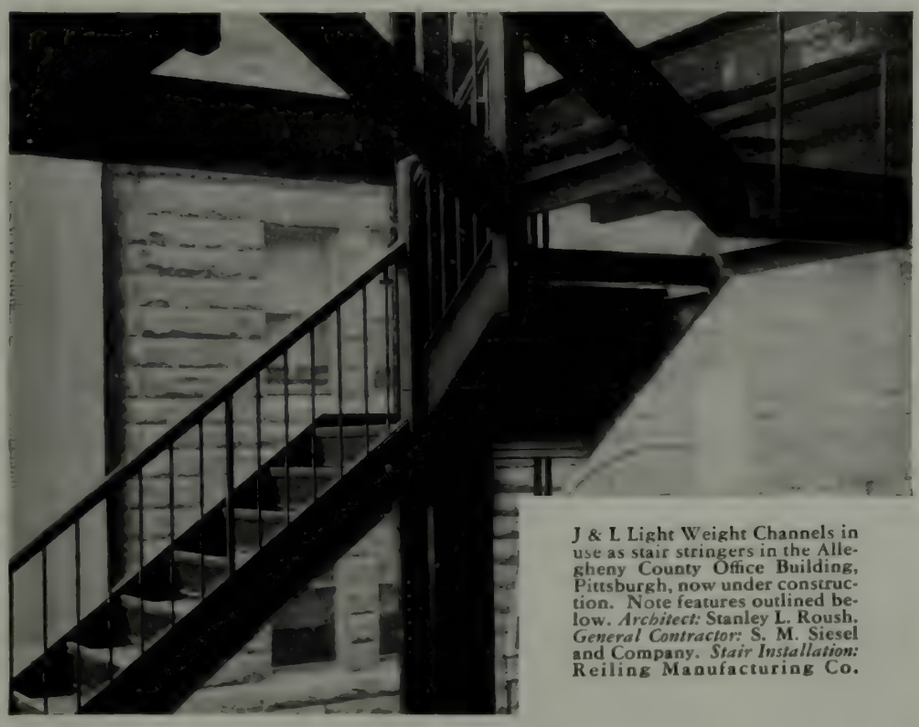
For All Cold Lines

J & L LIGHT WEIGHT CHANNELS

for STAIR STRINGERS AND OTHER USES

now available in 2 sizes and 3 weights

J & L Light Weight Rolled Channels, the economies and advantages of which as stair stringers have been demonstrated in many important installations during the last two years, are now available in two sizes, **10-inch in two weights, 8 lb. and 8.8 lbs., and 12-inch in one weight, 10.6 lbs.** The properties of these sections suggest that further familiarity on the part of architects, engineers and fabricators will develop many new and important uses for them.



J & L Light Weight Channels in use as stair stringers in the Allegheny County Office Building, Pittsburgh, now under construction. Note features outlined below. *Architect:* Stanley L. Roush. *General Contractor:* S. M. Siesel and Company. *Stair Installation:* Reiling Manufacturing Co.

5 Distinctive Advantages

1. SAVING IN WEIGHT.

J & L Light Weight Channels are approximately one-half the weight of the lightest standard rolled channels of equal depth, and offer greater strength than formed plates of equal weight.

2. EASE OF FABRICATION.

J & L Light Weight Channels are ready, as received, for fabrication, which may be accomplished quickly with a minimum of shop equipment at lowest cost.

3. EASE OF INSTALLATION.

Light weight, accurate dimensions, straight lines and square corners of J & L Light Weight Channels make for easy handling and speedy installation wherever they are used.

J&L LIGHT-WEIGHT CHANNELS

4. FINISHED APPEARANCE.

No rounded corners; straight, true lines and proper fitting at joints result in a finished job of unusually attractive appearance.

5. SCHOOLS AND PUBLIC BUILDINGS.

J&L STEEL

The 12-inch J & L Light Weight Channels are especially adapted to stair construction in schools and other buildings where a broad tread is required.

JONES & LAUGHLIN STEEL CORPORATION

American Iron and Steel Works

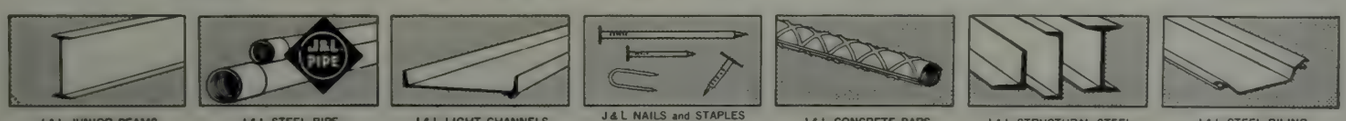
JONES & LAUGHLIN BUILDING, PITTSBURGH, PENNSYLVANIA

Sales Offices: Atlanta Boston Buffalo Chicago Cincinnati Cleveland Dallas Detroit Denver Erie Los Angeles Memphis Milwaukee Minneapolis New York Philadelphia Pittsburgh St. Louis San Francisco Washington

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JOHNS-MANVILLE
JM
PRODUCTS



The Terminal Tower, Cleveland's tallest structure, is protected by a Johns-Manville Bonded Built-up Asbestos Roof. Architects: Graham, Anderson, Probst and White, Chicago, Illinois.

This roof was applied by the Industrial Asbestos Products Company, authorized Johns-Manville roofing contractors, Cleveland, Ohio.

Johns-Manville
BONDED
BUILT-UP ROOFS

JOHNS-MANVILLE
JM
PRODUCTS

Only skilled use of the right materials will produce a good roof

SINCE the life and serviceability of a roof depend so much on the care with which the materials are applied, every Johns-Manville Built-up Roof is applied by an approved roofer picked because he has the necessary skill.

Our seventy years of manufacturing experience enable us to produce materials that we believe will meet your most exacting requirements. When these materials are applied by one of our carefully selected roofers, the result is a roof which assures your client, the building owner, long protection for his property and freedom from maintenance expense.

J-M Built-up Roofs are Bonded

In order to demonstrate conclusively our confidence in Johns-Manville roofing materials and the skilled work of J-M Roofers, we bond our roofs for an agreed-upon term of years. Each bond is backed by Johns-Manville and by the National Surety Company.

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We recognize that conditions of location, use of the building and its probable life all enter into the choice of roofing. To meet these conditions and the preferences on the part of those who specify or purchase roofs, Johns-Manville offers twenty distinct types of roofs, each embracing the highest grade of the particular materials used.

The men of our Architectural Service Department are always ready to cooperate with architects in considering the possibilities of any of the many Johns-Manville products that are used in building construction. We will be glad to show you samples of these products, or to mail such samples to you. We do not seek to displace any regular source of professional advice, but rather to place at your service all of our experience.

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CIVIC OPERA BUILDING
Chicago
Architect:
Graham, Anderson, Probst & White, Chicago
General Contractor:
John Griffiths & Son Co., Chicago
Heating Contractor:
Kinzie Engineering Co., Chicago
Plumbing Contractor:
M. J. Corboy, Chicago

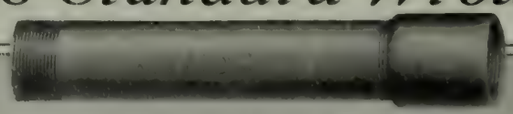
A TRIUMPH IN BEAUTY AND DESIGN

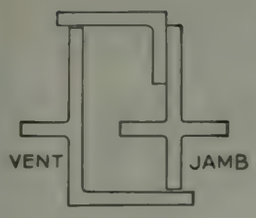
ELEVATING its magnificence more than a tenth of a mile above Wacker Drive . . . extending its wings from Washington to Madison . . . this monumental structure blends office building, Civic Opera and Civic Theatre in glorious concord . . . worthy of progressive America. So perfect a symphony reflects the high degree of skill, ingenuity and care exercised by the architects, engineers and contractors responsible. High standards of quality, performance and endurance for plumbing and sprinkler systems dictated the use of NATIONAL—

America's Standard Wrought Pipe

NATIONAL TUBE COMPANY · Pittsburgh, Pa.
Subsidiary of United States Steel Corporation

America's Standard Wrought Pipe





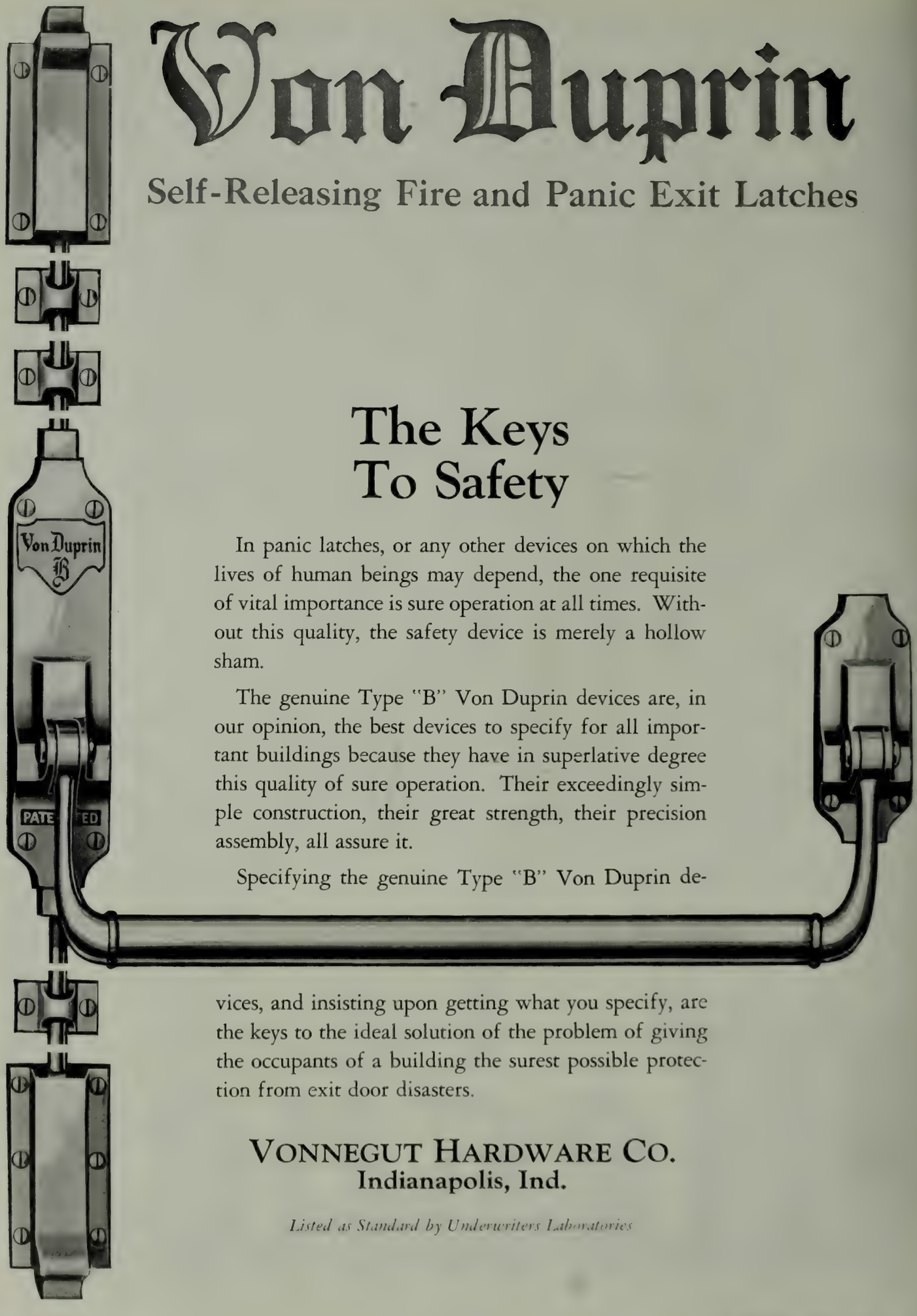
All-around double contact jamb section

The swift turn of architects and engineers to genuine wrought iron sash by MESKER is the natural reflection of crying need for window sash resistant to progressive corrosion † See how the originators and exclusive producers of this remarkable sash make easy its application to all standard jobs and introduce new possibilities for enduring special window treatment † Request Folder AR †

WROUGHT IRON SASH

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MESKER BROS. IRON CO., ST. LOUIS, MO.
Wrought Iron Window Sash Originators



Von Duprin

Self-Releasing Fire and Panic Exit Latches

The Keys To Safety

In panic latches, or any other devices on which the lives of human beings may depend, the one requisite of vital importance is sure operation at all times. Without this quality, the safety device is merely a hollow sham.

The genuine Type "B" Von Duprin devices are, in our opinion, the best devices to specify for all important buildings because they have in superlative degree this quality of sure operation. Their exceedingly simple construction, their great strength, their precision assembly, all assure it.

Specifying the genuine Type "B" Von Duprin devices, and insisting upon getting what you specify, are the keys to the ideal solution of the problem of giving the occupants of a building the surest possible protection from exit door disasters.

VONNEGUT HARDWARE CO.
Indianapolis, Ind.

Listed as Standard by Underwriters Laboratories

Alberene Stone Spandrels Enrich the Simple Lines of Modern Design with Color and Texture



Structurally and Mechanically Sound

Beauty combined with economy in both space and cost

SPANDRELS take up a definite area in the exterior walls of every large commercial building. This beautiful blue-grey stone offers the architect a new color and charming textures. As years pass soapstone weathers to pleasing tones of darker blue and green with glints of yellow.

ALBERENE STONE SPANDRELS are free for all time of maintenance costs. No painting—weather proof (that is if we may consider a material weather proof that will withstand the elements for 200 years as soapstone has on Independence Hall, Philadelphia).



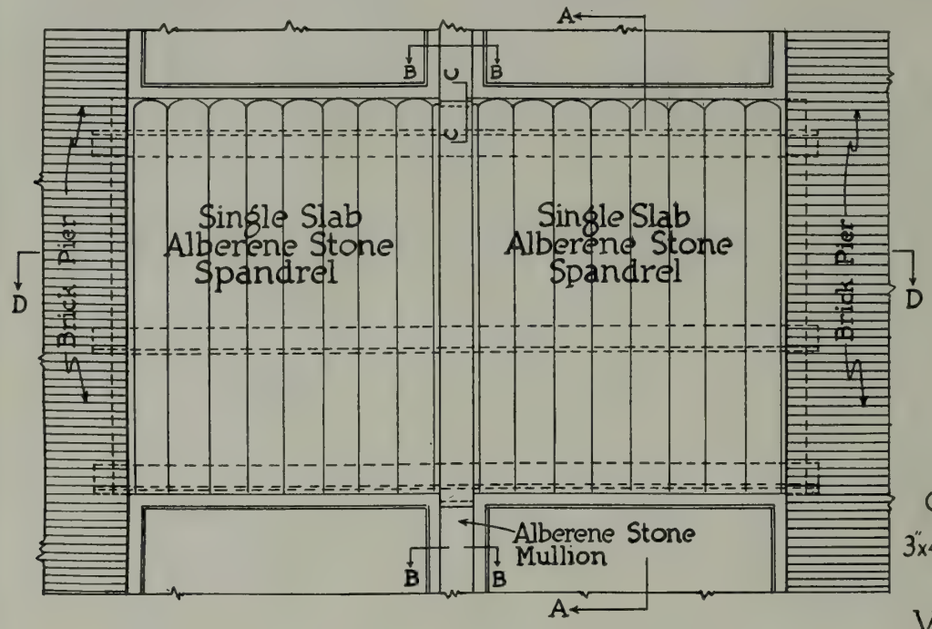
View of ALBERENE STONE SPANDRELS on the School of Education Building, New York University, N. Y. C., *James Gamble Rogers*, Architect

ALBERENE STONE SPANDRELS

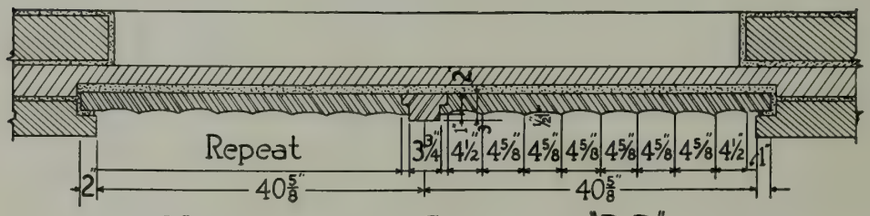
"Soapstone—an *age-old* material for the *new-day* designer"

Details of Alberene Stone (Soapstone) Spandrels

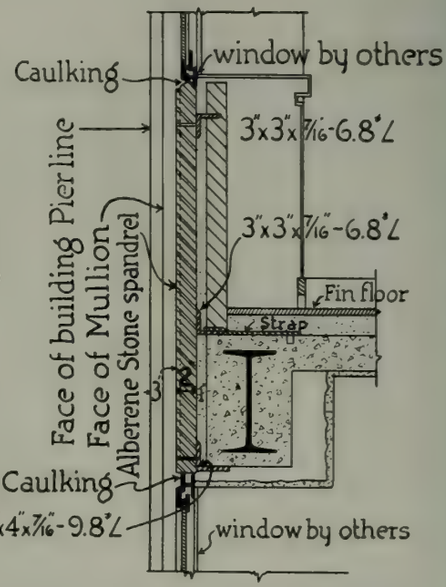
Adapted for Double Window Construction



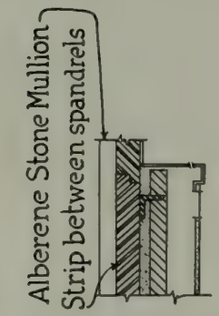
ELEVATION



HORIZONTAL SECTION "D D"



VERTICAL SECTION "A A"



SECTION "C C"

Method of connecting Mullion to strip between sections of spandrel.

Information for the Specification Writer on ALBERENE STONE SPANDRELS

Considered first from the standpoint of beauty, it later developed that the use of ALBERENE STONE SPANDRELS has important economical advantages as well. These details show how the exterior wall is reduced to a minimum thickness through the use of this type of wall-veil, providing adequate space for radiators to be installed without using up valuable floor space. Reduction of weight results in savings all along the line.

MATERIAL. (*Double Spandrels*) All spandrels to be structurally sound soapstone, grade equal to ALBERENE STONE. Stone not to be less than 1½" thick at thinnest point. Each pair of spandrels to be securely bolted to three horizontal angles extending 2" beyond spandrel at each end.

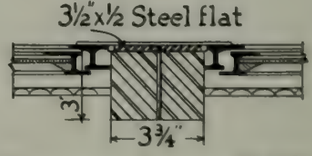
Bottom angle to be 3" x 4" x 7/16", center and top angles to be 3" x 3" x 7/16". Mullion to be 3¾" x 3¾" soapstone, rebated and bolted to steel flat 3½" x ½".

CONSTRUCTION. (*Double Spandrels*) Spandrels to be embedded in masonry 2" on each side, angles extending 2" farther into masonry to provide additional anchorage. Center angle to be bolted to unfinished floor by straps on 16" centers.

SPECIAL CASES. Where window is set with deeper reveal than face of spandrel, provide counter sill. Counter sill to be rebated for metal window frame and securely bolted to spandrel. Also provide soffit return for lintel at window head. Soffit to be bolted to under side of the 3" x 4" x 7/16" angle.

(*Single Spandrels*) Spandrels to be embedded in masonry 2" on each side.

NOTE. *Angles are not needed with single spandrel unless of excessive dimensions requiring multiple units. Where space is not larger than 4' 0" x 4' 0", we recommend the use of single slab rather than built-up spandrels.*



HORIZONTAL SECTION "B B"

Showing Alberene Stone Mullion bolted to steel flat-this Mullion continues same in section between spandrels and is bolted to same angles that secure spandrels.

Only a stone with the "structural timber" of ALBERENE can be used for such a slender mullion

ALBERENE STONE COMPANY, 153 West 23rd Street, New York

BRANCHES

CHICAGO :: PHILADELPHIA :: BOSTON :: NEWARK :: PITTSBURGH :: CLEVELAND :: RICHMOND :: WASHINGTON, D. C. :: ROCHESTER

QUARRIES AND MILLS AT SCHUYLER, VA.





Make the Facing bear its share with
. . . THE TILE THAT BINDS



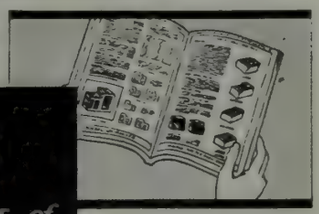
BRICK facing does not shirk its share, when backed with Natco Header Backer or Unibacker. Every sixth course a mechanical bond is established, so intimate that full bearing value is allowed on the full thickness of wall.

NATCO HEADER BACKER is furnished in various sizes for 10, 12, 14 and 16 inch walls. Backer units can be provided in varying heights, to meet various mortar joint conditions. Each Header and Backer is the equivalent of from 18 to 28 brick.

NATCO UNIBACKER is furnished for 12, 14 and 16 inch walls. Only the one style of unit is needed for all backing work. Each unit is the equivalent of from 8 to 12 brick. Smooth interior surfaces can be furnished on order.

These Natco Units are particularly adapted to curtain or closure walls where the highest type of construction is to be combined with minimum weight and foundation costs, economy in labor, mortar and time, fire safety, permanence and insulating value.

TURN TO SWEET'S

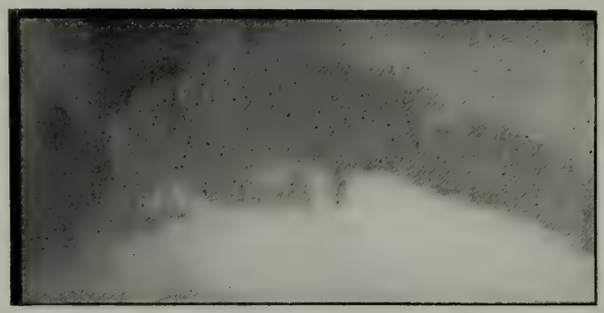


NATCO
THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

NATIONAL·FIREPROOFING·CORPORATION

THE LARGEST CONCERN IN THE WORLD MAKING A COMPLETE LINE OF STRUCTURAL CLAY PRODUCTS

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A New









Window Glass

New in Flatness—
New in Lustre



New manufacturing methods give Pennvernon Window Glass extreme flatness...uniform thickness...clearer visibility...high lustre on both sides...and freedom from defects

A FAR better window glass is now ready for you to use . . . at no greater cost than ordinary glass.

A new manufacturing principle makes this possible. Pennvernon Window Glass is *flat drawn* by a new method that takes it from molten "metal" into finished sheets without curving or flattening. It is *born* flat and *kept* flat.

Pennvernon Window Glass has a flatness and brilliance heretofore not expected in window glass. Its uniform thickness and freedom from defects make it easier to handle, cut and glaze. Inside or out, its surface lustre is equally bright. For Pennvernon Window Glass has *no wrong side.*

All distributing warehouses of the Pittsburgh Plate Glass Company, as well as many leading glass jobbers, are now ready to supply immediate deliveries.

Write for booklet just off the press, giving the story of Pennvernon Flat-Drawn Window Glass. Address the Pittsburgh Plate Glass Company, Pittsburgh, Pa.

PENNVERNON
flat drawn
WINDOW GLASS

Wilson

DIFFUSELITE BLINDS

(Reg. U. S. Pat. Off.)



Note soft diffusion of light; unobtrusive yet attractive appearance. Note how blind slides in grooves. Cannot sway or rattle in high winds. Sturdily constructed to outlast several installations of *ordinary* Venetian blinds.

Chosen As Best After Critical Test

1134 Wilson Diffuselite Blinds in One Building

Reduce Expense, Increase Efficiency for Mammoth Corporation

A few of the 1134 Diffuselite Blinds in building of United Shoe Machinery Corporation, Boston, Mass.



Daylight Spread Evenly Through Vast Areas

NO dark corners are permitted in the gigantic plant of the United Shoe Machinery Corporation. Space is too valuable. Every square foot must be utilized and well lighted.

When looking for the best way to obtain perfect diffusion of ample daylight; perfect ventilation without drafts, their engineers solicited samples of blinds from practically every manufacturer in the country.

They then investigated actual installation of Wilson Diffuselite Blinds and installations of these many other blinds. Obtained the opinions of users. Checked up on length and degree of service given by different installations in many large plants.

As a result, the 1134 windows in their mammoth building have been equipped with Wilson Diffuselite Blinds; 29750 square feet of Diffuselite blinds give perfect lighting and perfect ventilation to a degree possible only with a blind that has been perfected during 50 years of experimentation.

Wilson Diffuselite Blinds cost a little more than the others, but experience of users showed that because maintenance costs are avoided by the sturdy construction of Wilson Blinds, they are the most economical.

For full details send for Booklet No. 7

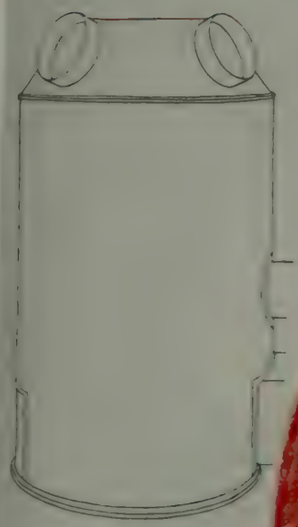
THE J. G. WILSON CORPORATION

11 East 38th Street New York City

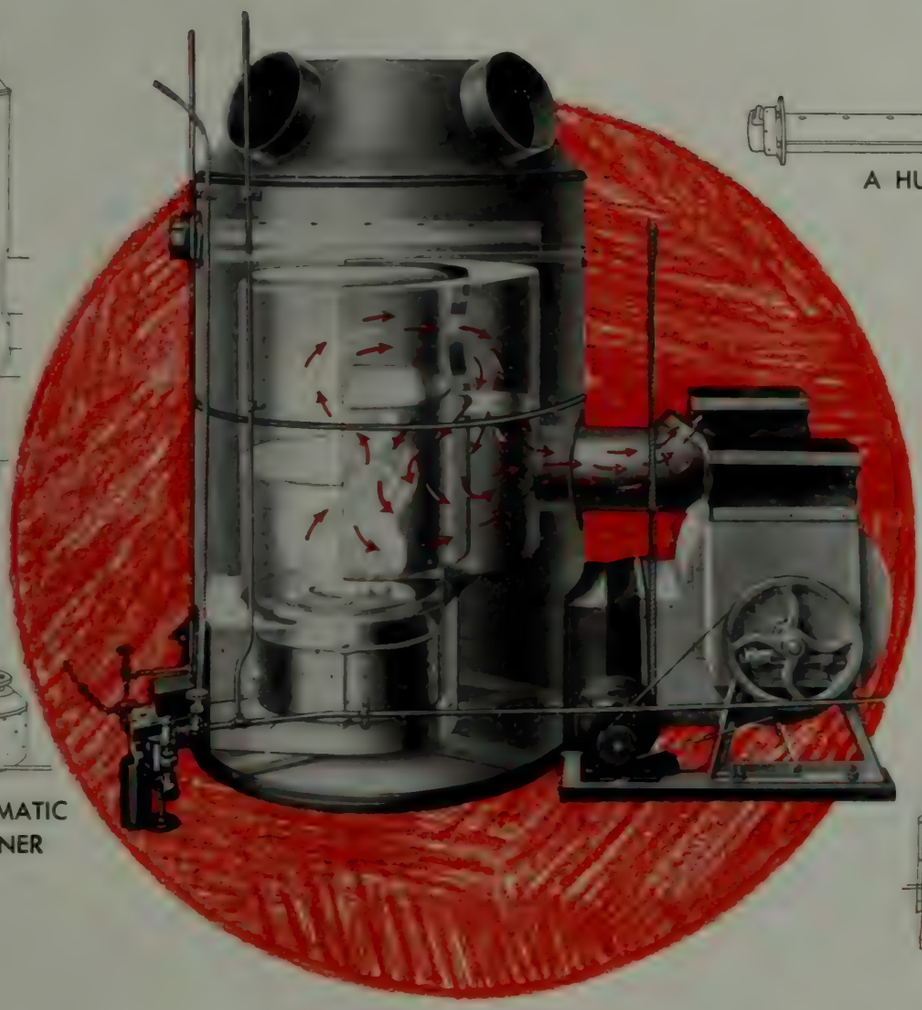
Offices in All Principal Cities

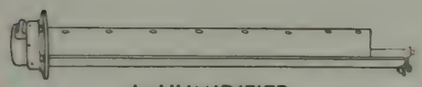
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IN ONE UNIT



A WARM AIR FURNACE

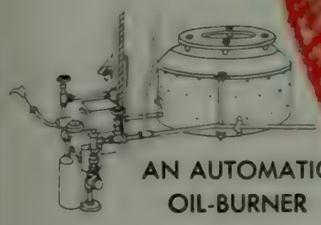




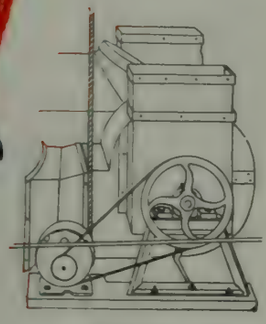
A HUMIDIFIER



A THERMOSTAT



AN AUTOMATIC OIL-BURNER



A FORCED AIR BLOWER

ALL
for the price of a good oil-burner alone

From architects, speculative builders, everyone, come inquiries on this latest marvel of the heating industry—The Piatt Automatic Oil-Burning Furnace. The heating element is the famous Piatt principle tested on battleships, in use in hundreds of homes, schools, apartment houses in other Piatt appliances. It is safe, certain and employs the simplest kind of construction.

The various parts are not in any sense attachments but the whole scientifically designed and built as a complete heating unit. Each part is calculated with precision to work perfectly in relation to the complete assembled plant. Smaller heat-conductor pipes may be used with a resulting gain in head room. The furnace need not occupy the middle of the cellar and additional space is made available.

The force air feed keeps a flow of warm, moist air circulating through all registers and all corners in the wintertime. It can be used to stir up cool breezes in the summer. The Piatt is considered the heating sensation of the century. Examine its construction closely, send for complete technical data which will be gladly furnished.

MOTOR WHEEL CORPORATION, Heater Division · LANSING, MICHIGAN

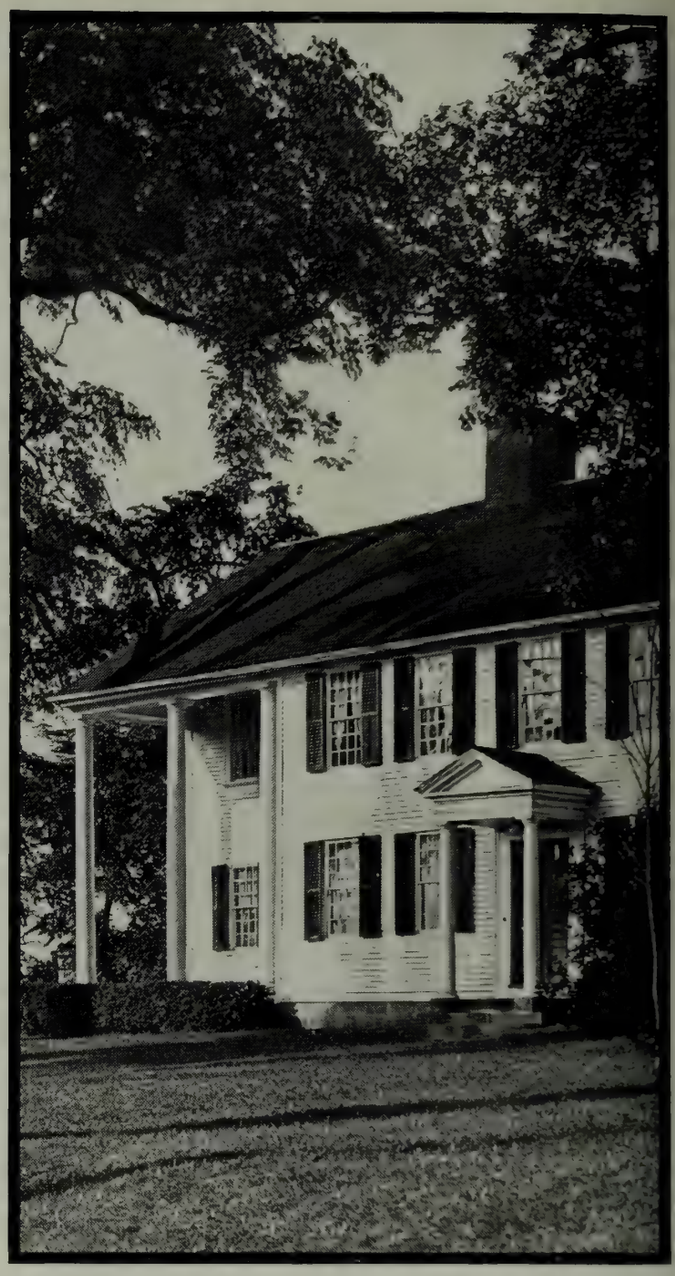
PIATT

OIL-BURNING APPLIANCES

GAY LAUGHTER...

STILL RINGS THROUGH THESE MELLOWED, FINE OLD ROOMS





The Oliver Ellsworth house at Windsor, Conn., built of White Pine in 1750, and standing today.

YOU WILL FIND these beautiful old places throughout New England . . . quiet, livable spots built by craftsmen when the Colonies were young. In almost every case, genuine White Pine was used. And Idaho (genuine) White Pine is available in abundant quantities for the homes of today!

Years mean nothing to Idaho White Pine. It is nature's finest building lumber. The sun and storm of generations can have little effect upon it . . . exposure to the weather will only increase its charm. And the surface, smooth with the sheen of satin, will remain that way, the grain a thing of beauty.

Idaho White Pine is easily worked. That fact alone commends it to builders and architects for modern decoration. A dining-room with old pine sheathing . . . a simple mantel over the fireplace, on which will rest old pewter pieces . . . a delicately traced Palladian window . . . for almost any inside or outside work, Idaho White Pine cannot be equaled.

The trade-mark imprinted on Idaho White Pine offers definite assurance that the wood is genuine White Pine—and there *is* a difference.

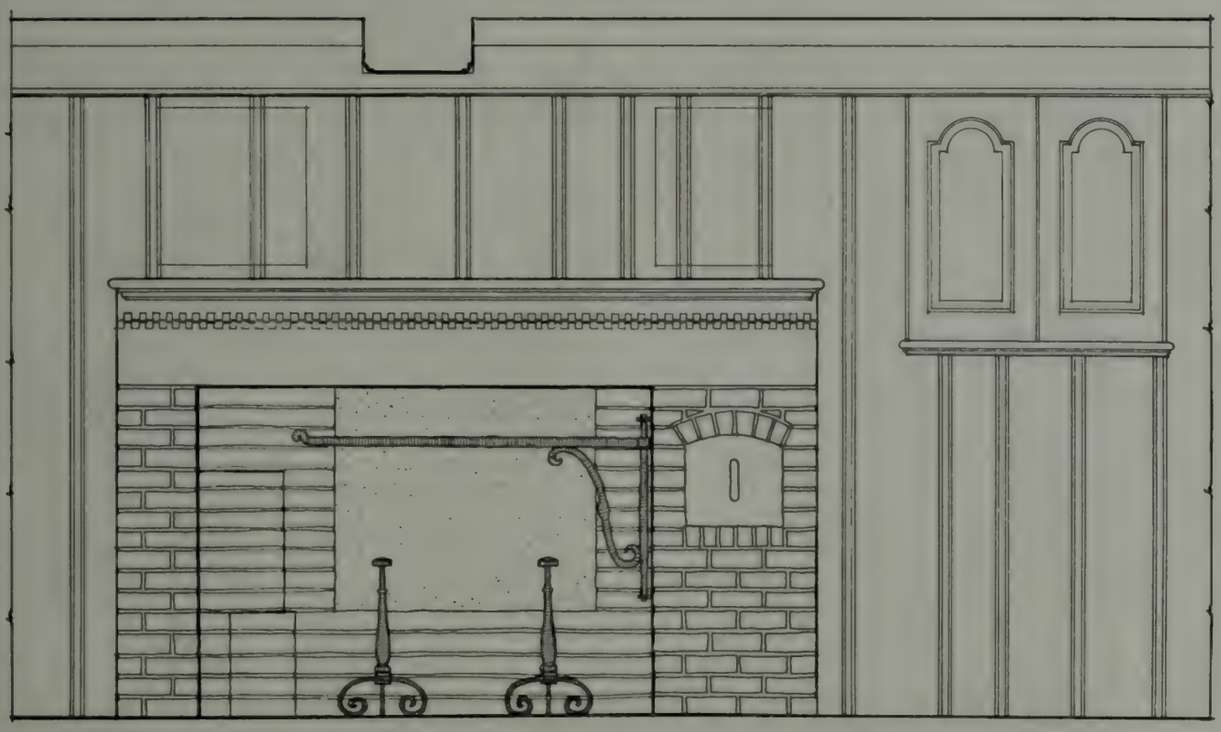
Western Pine Manufacturers Association, Portland, Oregon.

IDAHO (GENUINE) WHITE PINE · IWP

This trade-mark is imprinted on Idaho White Pine at the mills . . . and is a definite protection for home owner, builder, architect and lumber dealer.

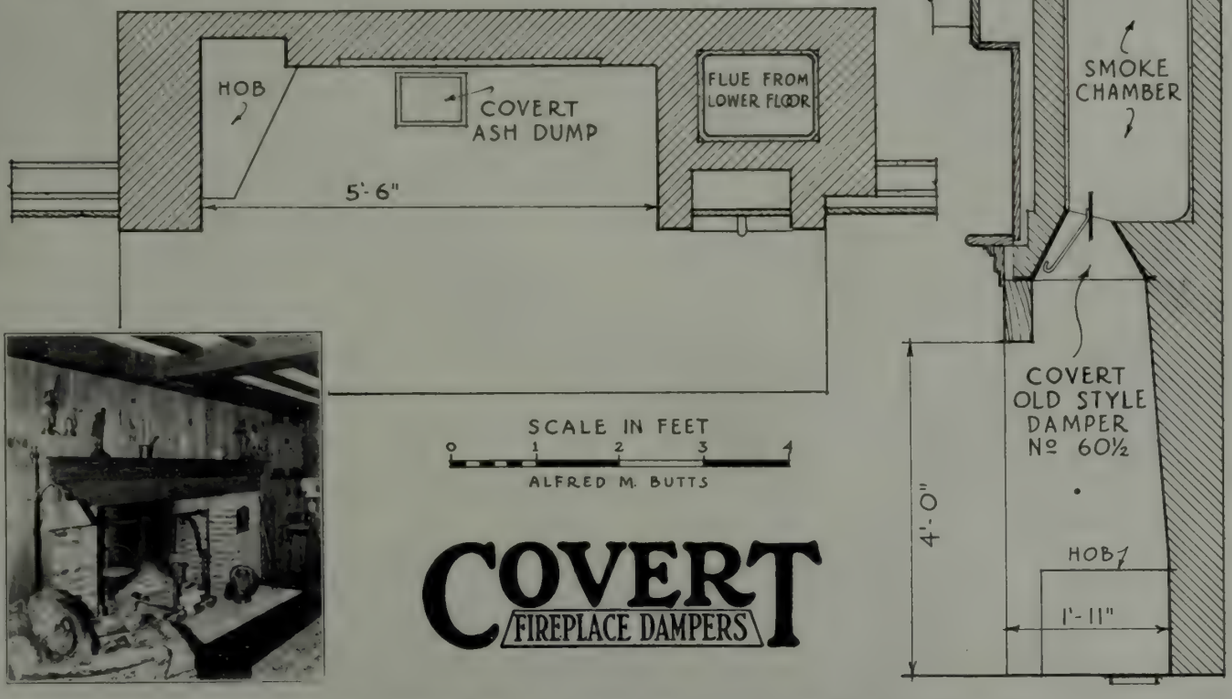
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RESIDENCE OF MRS. M. C. REILLY
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General Contractors,
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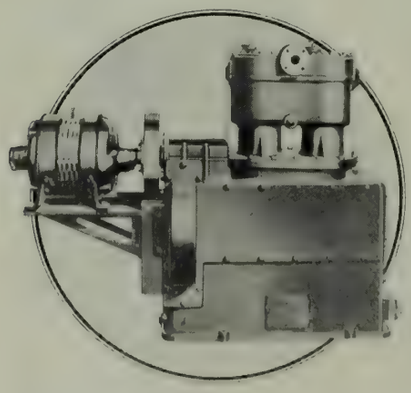
"QUALITY MACHINES FOR QUALITY SERVICE"



KOPPERS BUILDING
PITTSBURGH, PA.

A complete line of Westinghouse-National Compressors is available—ranging from 3 to 700 cu. ft. displacement—for use in office buildings, printing plants, garages, factories, etc. They have won a reputation for economy, reliability and long life.

Another Distinctive Building



Two "2 VSW" Westinghouse-National Air Compressors of 75 cu. ft. displacement, like the one shown above, are used in the Koppers Building to supply air for general purposes. A QL-14 compressor, 25 cu. ft. displacement, furnishes high pressure air for use in the fire protection system.

—in which Westinghouse-National Air Compressors have been installed . . . This structure, towering 32 stories above the street level, presents an imposing appearance. As an outstanding example of the up-to-date office building, it is unsurpassed . . . Modern equipment added to modern construction assures adequate service for tenants. Westinghouse-National Air Compressors furnish air for the varied pneumatic needs of the building—reliably and economically.

WESTINGHOUSE TRACTION BRAKE COMPANY
Industrial Division - - - Wilmerding, Penna.

WESTINGHOUSE—NATIONAL
Air Compressors



A diver's Job?

by no means!

BECAUSE →



Inspecting the *Jennings Sewage Pump* *is not a* DIVER'S JOB

BECAUSE *a Jennings is located above the pit*

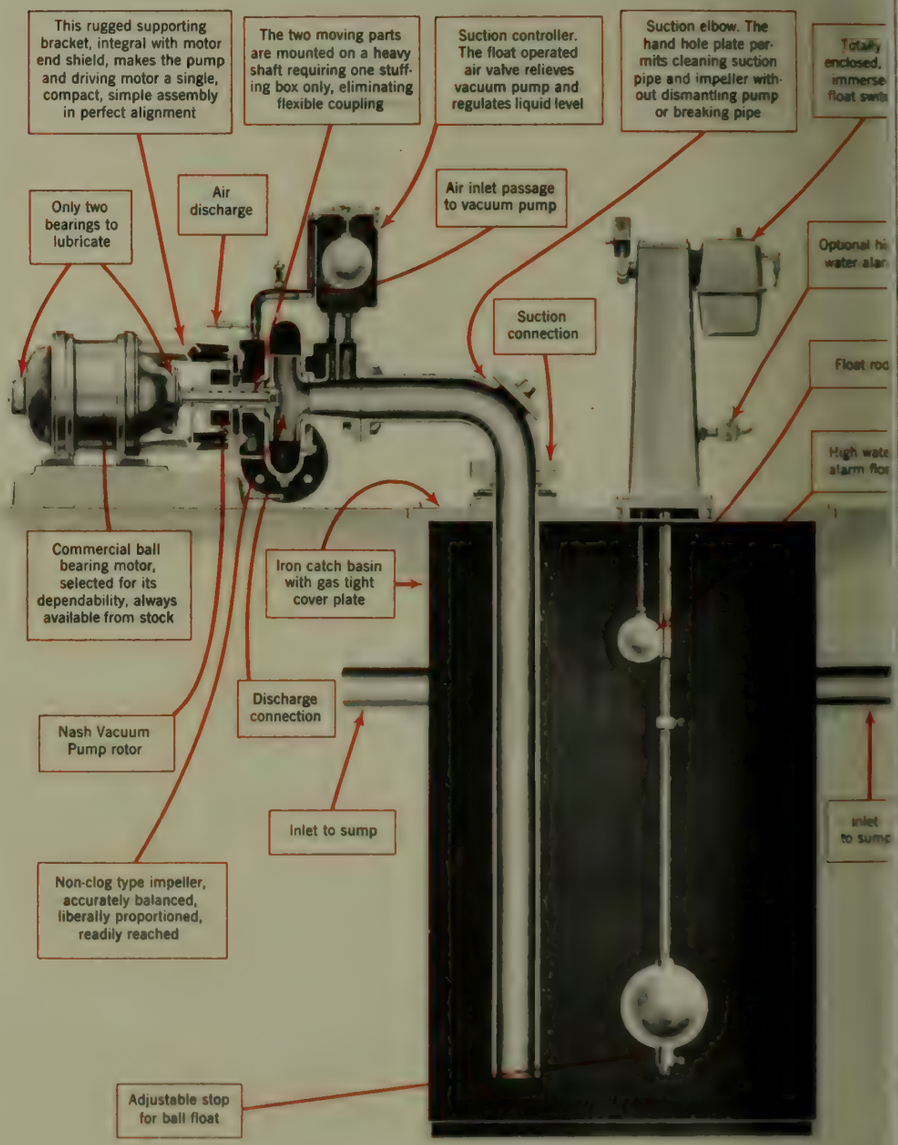
Jennings Suction Sewage Pumps are so designed that only the suction pipe is submerged in the pit. Every working part is above the floor level where it can be gotten at without taking off the pit cover.

The main pumping unit is an efficient two-bladed bronze impeller. It handles solid matter without clogging.

Mounted on the same shaft with the centrifugal impeller and enclosed in the same casing, is a Nash Hytor Vacuum unit. When the pump starts, this unit quickly exhausts air from the suction pipe and draws sewage into the pump casing. Full rated capacity is delivered immediately by the impeller.

The Jennings Suction Sewage Pump will not clog, will not air bind, will not lose its prime. No screens are required.

Furnished in capacities up to 450 g. p. m. Heads up to 75 ft. Write for Bulletins 113 and 124.



Jennings SUCTION SEWAGE *Pumps*

NASH ENGINEERING COMPANY SOUTH NORWALK, CONN., U. S. A.



This greenhouse has architectural charm...

A Bit Severe of Line . . . Yet Strangely Appealing . . .
This King House Proves a Gratifying Achievement

Adorning a very beautiful Pennsylvania estate, the greenhouse above stands as an eminent example of how King adaptability and design can merge with architectural skill. Here is an achievement worthy of the finest surroundings!

Yet with all its beauty and adornment value, this King is as sturdy and useful as the all steel house built for strenuous commercial practice. Indeed, it *is* the well-known steel frame King, but more beautifully and unusually accoutered.

Let our Architects' Bureau help you with suggestions and, if you wish, rough sketches. This service is without cost and happily extended. Won't you avail yourself of it?

Your letterhead will promptly bring our new and helpful portfolio of plates showing King houses which have been constructed on many of America's leading estates.



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A Complete Trumbull Installation

The beautiful Horace Bushnell Memorial at Hartford, Connecticut

CORBETT, HARRISON & MCMURRAY, New York
Architects



THE ELECTRICAL EQUIPMENT for the Bushnell Memorial Hall, the magnificent auditorium dedicated to the Public of Hartford, is the finest that money can buy and is a 100% Trumbull Installation.

The Trumbull "Controlite" is of the multi preset type and incorporates many unusual and valuable features. The control board—including dimmer bank—is over 16 feet long and weighs several thousand pounds, yet the entire preset control, under a closing door, is located at the center of the switchboard.

All other Switchboards, Panelboards, Safety Switches and Motor Starting Switches are Trumbull, "Circle T" products.

The bulletin of Trumbull "Controlite," covering theater control boards, will be gladly furnished on request.

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ATLANTA

23 FLOORS of R-G Steel Deck Construction



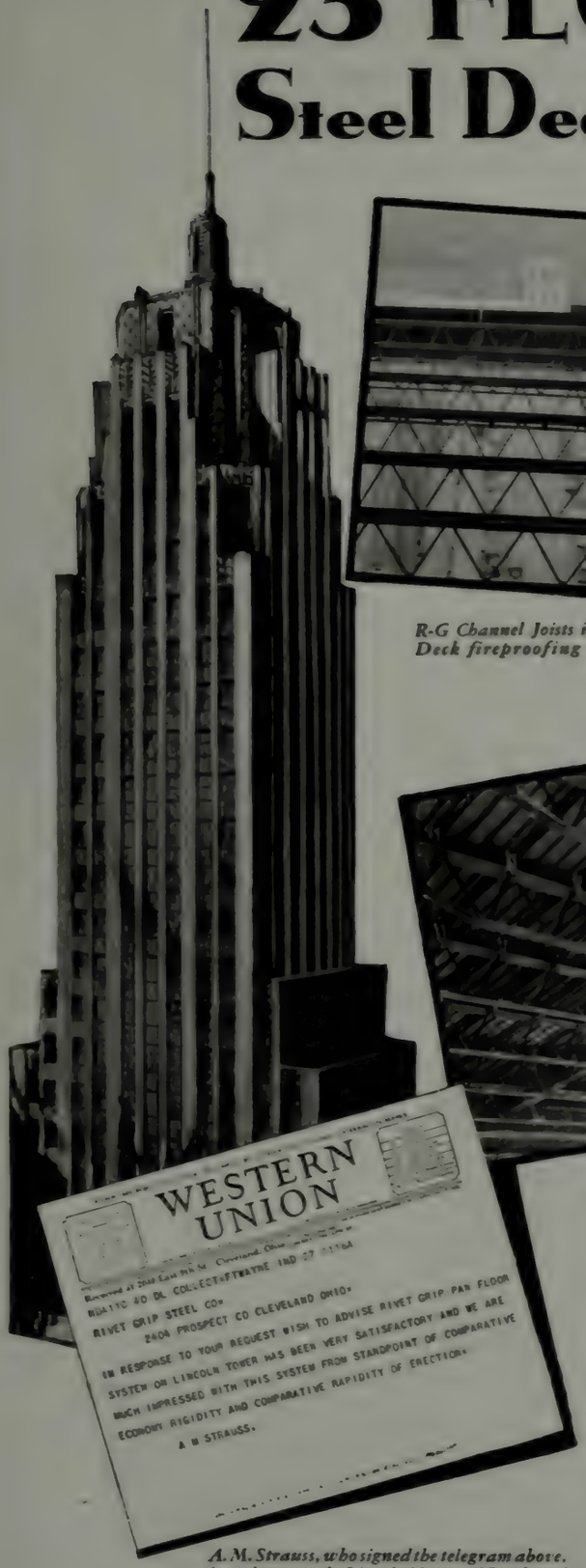
R-G Channel Joists in place ready for Stee Deck fireproofing and bridging forms.

Close-up of bridging beam forms which are integral with and are suspended from steel deck pans for forming solid concrete beams six inches wide at right angles to steel joists.



View of under side of R-G Steel Deck Construction after pouring.

Workmen installing steel deck pans and girder fireproofing forms at 14th floor level.



WESTERN UNION

RIVET GRIP STEEL CO

2402 PROSPECT CO CLEVELAND OHIO

IN RESPONSE TO YOUR REQUEST WISH TO ADVISE RIVET GRIP PAN FLOOR SYSTEM ON LINCOLN TOWER HAS BEEN VERY SATISFACTORY AND WE ARE MUCH IMPRESSED WITH THIS SYSTEM FROM STANDPOINT OF COMPARATIVE ECONOMY RIGIDITY AND COMPARATIVE RAPIDITY OF ERECTION

A M STRAUSS.

A. M. Strauss, who signed the telegram above, is architect on the Lincoln National Bank and Trust Co. Building. Buesching-Hagerman Co., Ft. Wayne, are the general contractors.

THE 23-story Lincoln National Bank and Trust Co. Building in Ft. Wayne, Ind., was originally designed for concrete joists and slab floors. Reduction of dead load through the use of R-G Steel Deck Construction permitted savings in structural steel and foundations of this building virtually equivalent to the cost of R-G channel joists and steel deck installed.

Write for details showing economies possible with this type of construction.

THE RIVET-GRIP STEEL COMPANY · *2402 Prospect Ave., Cleveland, Ohio*

STEEL DECK **RG** FLOOR CONSTRUCTION



Residence
Bayville, L. I.

Architects
Delano & Aldrich

Perfect Harmony

Variegated Vermont Slate, in softly blended colors and graduated thicknesses, following a carefully worked-out design, give this Tudor Stone Roof a dignity and restraint in perfect harmony with the architecture of this stately Georgian residence.

Rising·and·Nelson·Slate·Company

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NEW G-E TRIP-FREE BREAKERS

Types CN-1, CP-108, and CK-8 for Buildings



TYPE CN-1, 3 to 300 amperes—CP-108, 15 to 1200 amperes—Type CK-8, over 1200 amperes—trip-free from handle on overcurrent—time delay or instantaneous in action—triple-contact, no burning on main brush—easily replaceable burning tips—high-pressure, yet easy-closing, main contact—brush laminations make individual end-on contact, closing with a wiping motion—low operating temperatures.

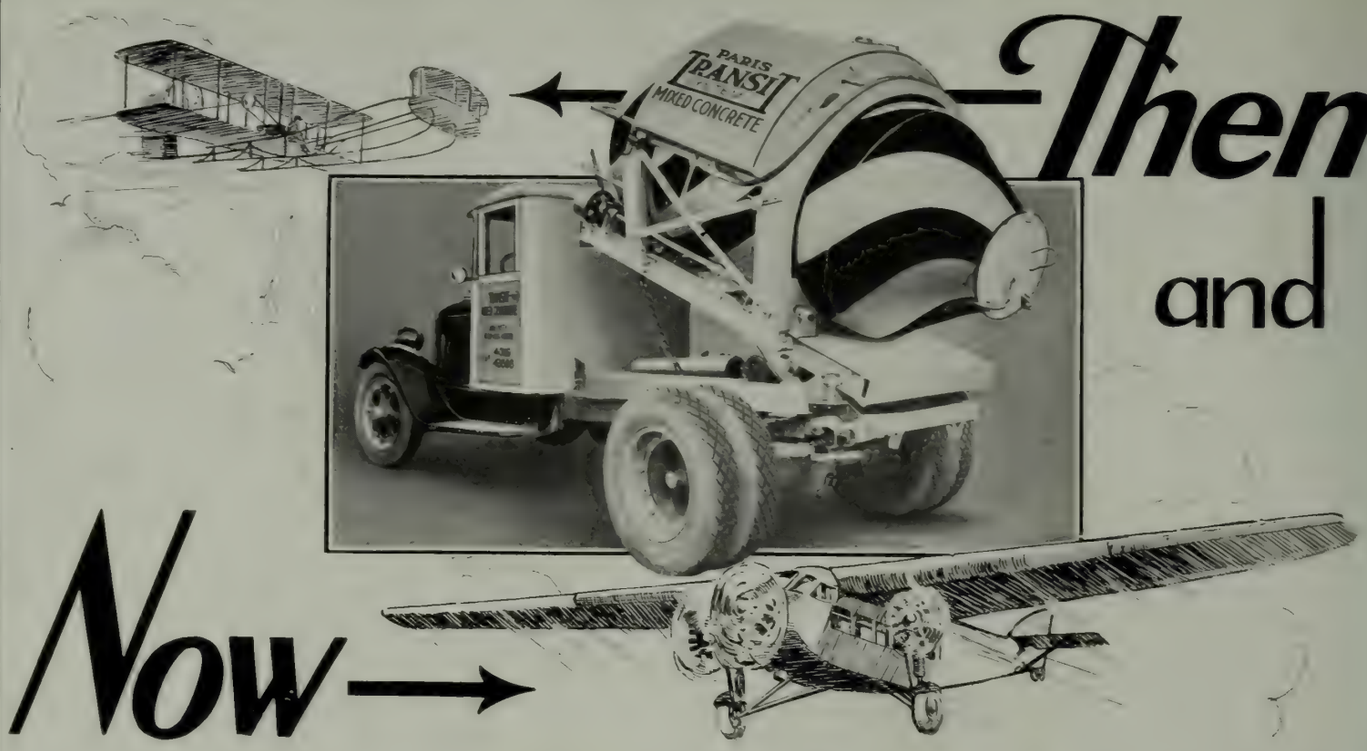
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GENERAL ELECTRIC

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Then and Now

Compare the early type of Airplane with the giant Aerial Transport of today, and you have a picture of the difference between the old system of mixing concrete on the job and the Modern Paris TRANSIT System.

MODERN construction demands call for modern methods—To do a better job, to do it quicker and with greater economy, new tools must replace the old.

Today—concrete is king. New standards of design and control, mixing and delivering enables the Architect, the Engineer and the Contractor to build with strength, security and permanence.

PARIS TRANSIT SYSTEM MIXED CONCRETE

—the modern Paris TRANSIT System "specification" concrete is now available in a rapidly growing list of cities and towns throughout the nation.

Backed by a strong chain of responsible Paris TRANSIT Operators, great and small structures everywhere attest the importance of this modern strength concrete and are monuments to advanced methods.

AN IMPORTANT POINT TO REMEMBER

Paris TRANSIT System Mixed Concrete is the product of Paris TRANSIT Mixers—a complete and Proven concrete system—Nationally Advertised and Nationally Available. Write us for further information.

A booklet "Concrete Facts" will be mailed you on request.



TRANSIT MIXERS, Inc.

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For HOTELS..BANKS..OFFICES..

specify wood





ABOVE, RIGHT. *Heavy wood beams and wood furniture make this hotel lobby comfortable . . . friendly . . . attractive.*

RIGHT. *Showing how wood may be used in a Directors' room. The natural beauty of wood plus its adaptability . . . enduring qualities . . . superior insulation . . . make it the ideal construction material for interiors which demand distinction.*

and guarantee your specifications with "Tree Mark"



An interior view of a modern bank, showing how the artistic use of wood relieves the formality in offices of this nature.

WHEN you specify wood—whether for homes, offices, commercial buildings, factories, hospitals—insist upon "Tree Mark" and you can be sure that the lumber used will meet every specification.

The National Lumber Manufacturers Association guarantees that lumber marked with the "Tree Mark" is exactly as indicated by the expert grader.

Now that Building and Loan Associations are sponsoring the movement that all homes must be constructed with materials of known value, "Tree Mark" lumber is more significant than ever before. Let the National Lumber Manufacturers Association help you. Expert in every phase of lumber technology and engineering methods, its assistance is offered to you free of charge or obligation.

Mail the coupon for a free copy of a booklet which contains detailed information about the efficient use of grade- and trade-marked lumber.

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This Tree symbol stamped on a piece of lumber is your guarantee that the grade and species indicated thereon by the marks of the expert grader are correct.

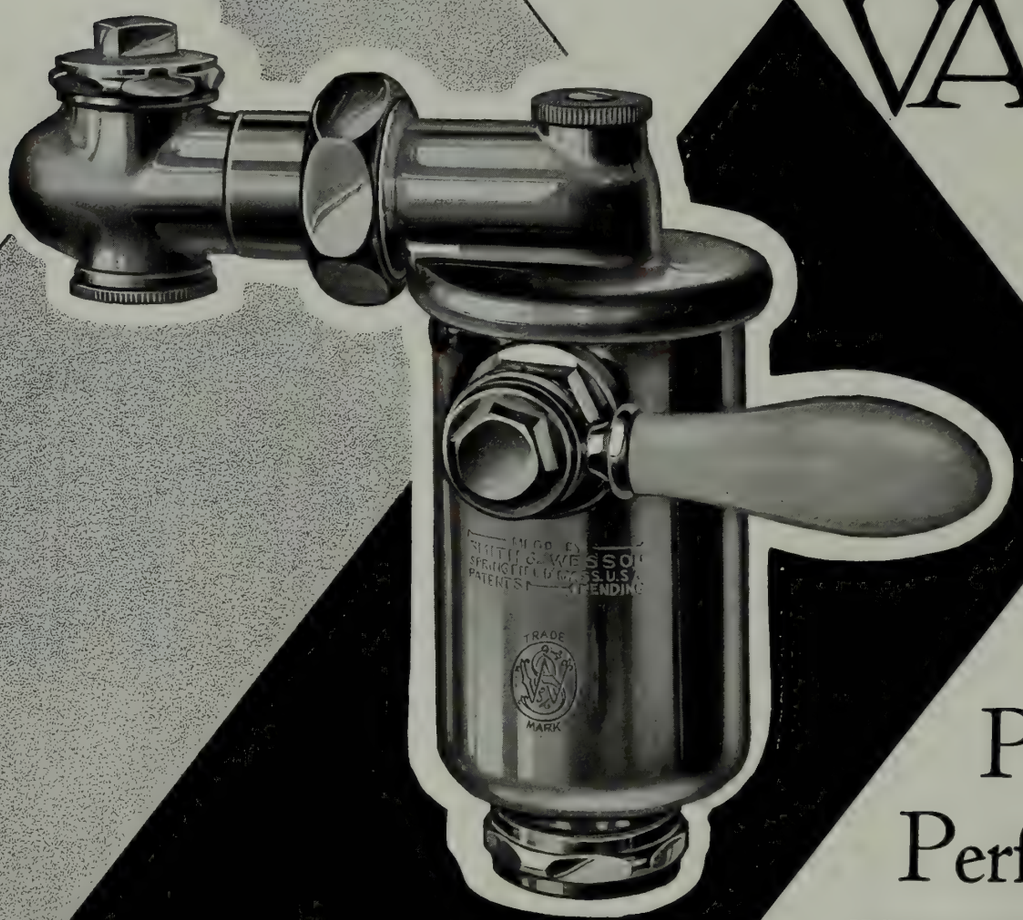
National Lumber Manufacturers Association
Dept. 605, Transportation Bldg., Washington, D. C.
Send me a free copy of "Taking the Mystery Out of Lumber Buying" and "Information on Lumber and Where to Find It."
Please send me special information on the design of a

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SMITH & WESSON FLUSH-VALVES



The Peak of Positive Performance-

Webster says:—
Peak = The top.
Positive = Absolute (perfect.)
Performance = A thing done, achievement.

The *Performance* of the Smith & Wesson Flush Valve is a *Positive* flushing of Closet Bowls in a dependable manner, which places it at the *Peak* of the Flush Valve Industry.

For further information write:
FLUSH VALVE DIVISION

SMITH & WESSON, SPRINGFIELD, MASS.

VERSATILITY ««



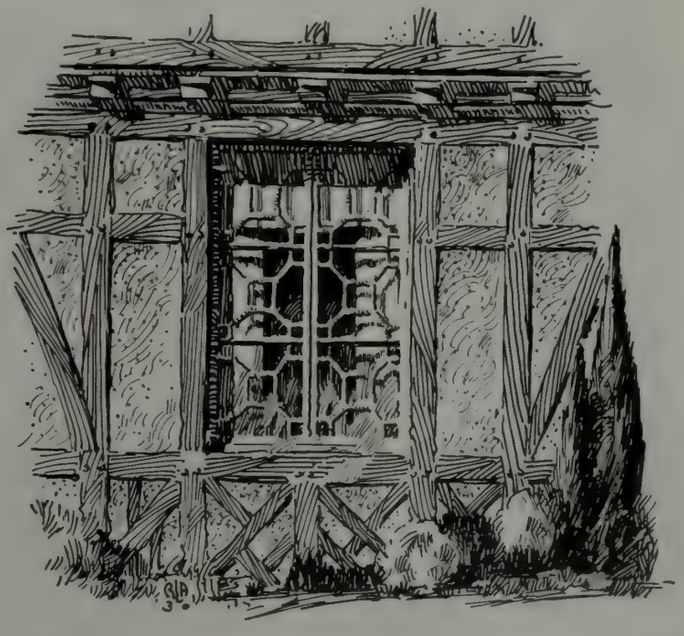
One of the interesting things about the new Fenestra "Fencraft" Casements is the way they harmonize with different types of architecture. Notice their variety: Leaded with picturesque glass roundels in an English style house; with vertical muntins omitted in a Spanish type; and with a leading suggestive of Normandy. In the architect's capable hands, there's almost no end to the versatility of these better steel windows!

Hardware of solid bronze or nickel silver has Coinage, Scaly, Sand or Hammered finish. Inside screens are of bronze. The heavy construction favors glazing in leaded or plate glass where desired. Heavy, sherardized hinges are fitted with 100% bronze bearings. Each casement section is gauged for straightness. New catalogue ready.



DETROIT STEEL PRODUCTS COMPANY
2285 East Grand Boulevard Detroit, Michigan
Factories: Detroit, Mich., and Oakland, Calif.
Convenient Warehouse Stocks

Fenestra
FENCRAFT
CASEMENTS
(Screened)



CLIMAXING

39 Years' Leadership

Wheeling Building Materials now made of

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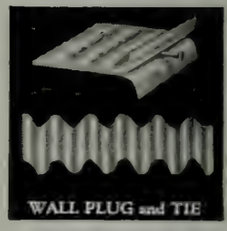

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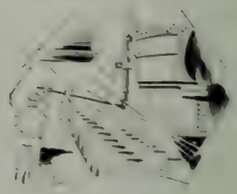
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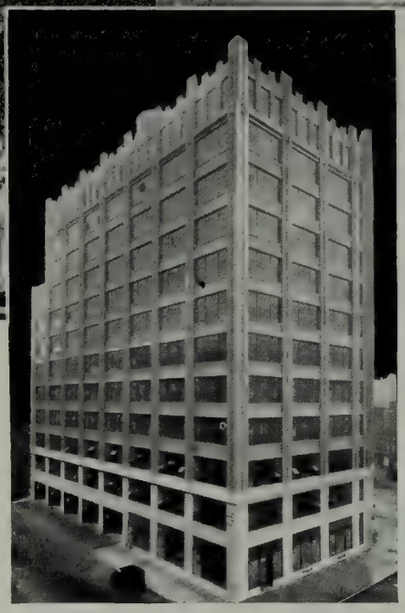


Chancery Building, Detroit. Architect, Donaldson & Meier, Detroit. Contractor, Talbot & Meier, Detroit.



Montgomery Ward & Co., Albany, N. Y. Designed by W. H. McCaully, Eng., Chicago. Contractor, Wells Brothers Construction Co., Chicago.





Green Industrial Building, New York. Architect, Renwick, Aspinwall & Guard, New York City. Contractor, Turner Constr. Company, New York City.

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Medical Arts Building, Nashville, Tenn. Architect, Alsop & Callanan, Memphis, Tenn. Contractor, Foster & Creighton, Nashville, Tenn.



Shibaura Engineering Works, Tsurumi, Japan. Designed and built by H. K. Ferguson Co., Cleveland.

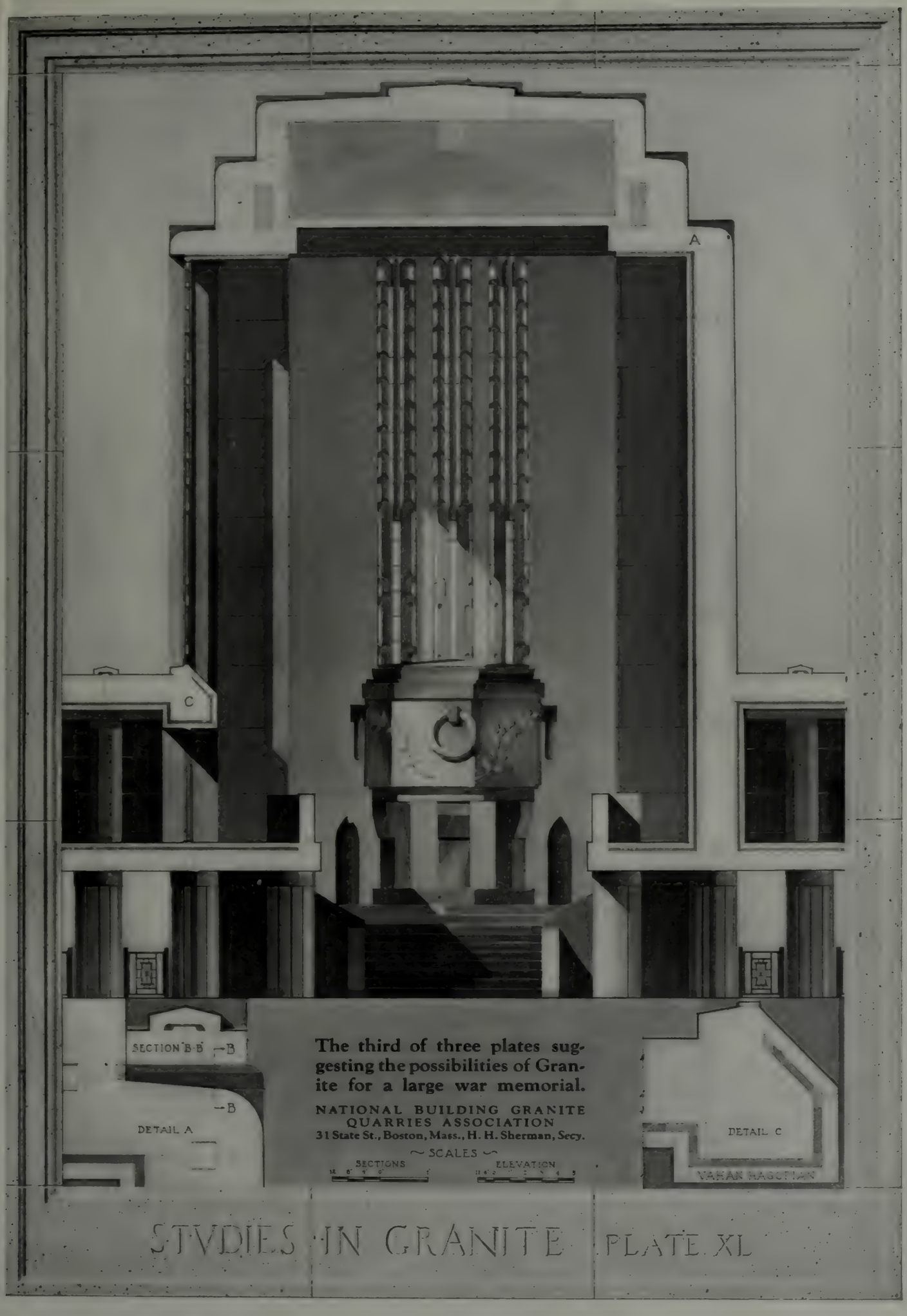


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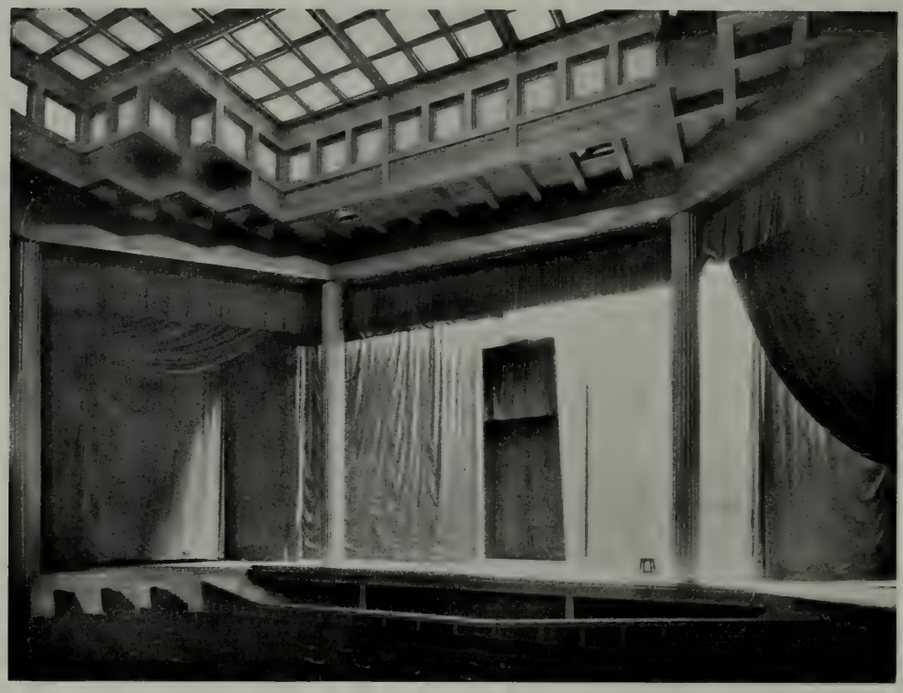
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The third of three plates suggesting the possibilities of Granite for a large war memorial.
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STVDIES IN GRANITE PLATE XL

THE ARCHITECTURAL RECORD TECHNICAL NEWS FOR MAY: THE THEATRE



THEATRE IN THE PARIS EXPOSITION OF 1925

A. AND G. PERRET, ARCHITECTS

Showing the development of a stage with two wings extending slightly forward so that the action tends to envelop the audience. Poelzig in Germany developed a similar scheme. (Page 491.)

As Mr. Lee Simonson points out in his "A.B.C.'S of Theatre Architecture" on page 447, the era of the great speculative returns on cramped playhouses is passing; we find a strong tendency toward steady production by producers owning their own houses and appealing to a more permanent audience; we also find an enormous growth in community, college, and high school theatres.

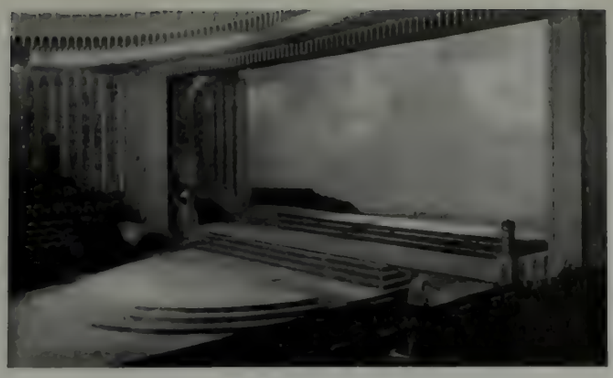
This means that there can now be a return to adequate stage design which on Broadway or State Street has had to be badly neglected.

In the present study especial attention is therefore paid to the needs of community theatres; but the outline covers the older type of commercial house as well. There is considerable matter on sightlines and on illumination, that applies everywhere, and has not to our knowledge been collected before.

The aim has also been to deal with the problems of theatre design as they present themselves to the architect in practice. No rules or dogmas can be laid down, and there is no attempt to guide the designer: rather, the effort has been to publish the



EXPERIMENTS WITH LIGHT IN THE YALE UNIVERSITY THEATRE



A STAGE WITH THREE PROSCENIUM PLATFORMS

information that seemed most useful, authoritative, and up-to-date.

The distinguished collaborators in the preparation of this number have already been mentioned: Mr. Lee Simonson, Mr. Kenneth Macgowan, Mr. Norman Bel Geddes, Mr. Munroe R. Pevear, and Mr. G. T. Stanton have been liberal with their time and with the knowledge they have gained as experts in their several lines; and many architects who are not named here have helped to make the study possible.

THE ARCHITECTURAL RECORD hopes that its readers will comment freely on this article, which carries forward the effort to make every number of the magazine a reference number of thorough and permanent worth.

Special factors bearing on auditorium design and on the latest advances in illumination will follow in a separate article.

THE ARCHITECTURAL RECORD TECHNICAL NEWS FOR JUNE: THE FILLING STATION

HERE is a form of architecture—if the current examples may always be called architecture—that is typically American. The filling and service station is as necessary to our motoring public as was the old-fashioned inn to travellers of stage-coach days; and there have been predictions that, like the inn, the filling station in many cases will gather so many subsidiary services about it as to become the nucleus of a future population center.

In the present study there is laid down a functional approach to filling station design. Although many of our present picturesque examples in the shape of brown derbies or Mother Goose's Shoe have their charm, the architect is likely to leave such expressions to artists more naive than he. Nor is it necessarily quite adequate to make the filling station a small colonial cottage. What then? Well, after the necessary facts of general application are in, the architect will always decide the particular case in hand. In June we shall present as many as we can of the necessary facts that are of general applicability.



Pavilion, Civic Center, Lakeland, Florida. Poteet and Whitworth, Architects, Lakeland. Union Metal Steel Columns with composition capital, Design No 212.

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VIEW OF PYLONS, SOLDIERS' AND SAILORS' MEMORIAL BRIDGE, HARRISBURG, PENNSYLVANIA; GEHRON AND ROSS, ARCHITECTS; RENDERING BY ERNEST BORN

THE ARCHITECTURAL RECORD

AN ILLUSTRATED MONTHLY MAGAZINE OF ARCHITECTURE & THE ALLIED ARTS & CRAFTS

VOLUME 67 MAY · 1930 NUMBER 5

SOME NOTES ON BRIDGE DESIGN

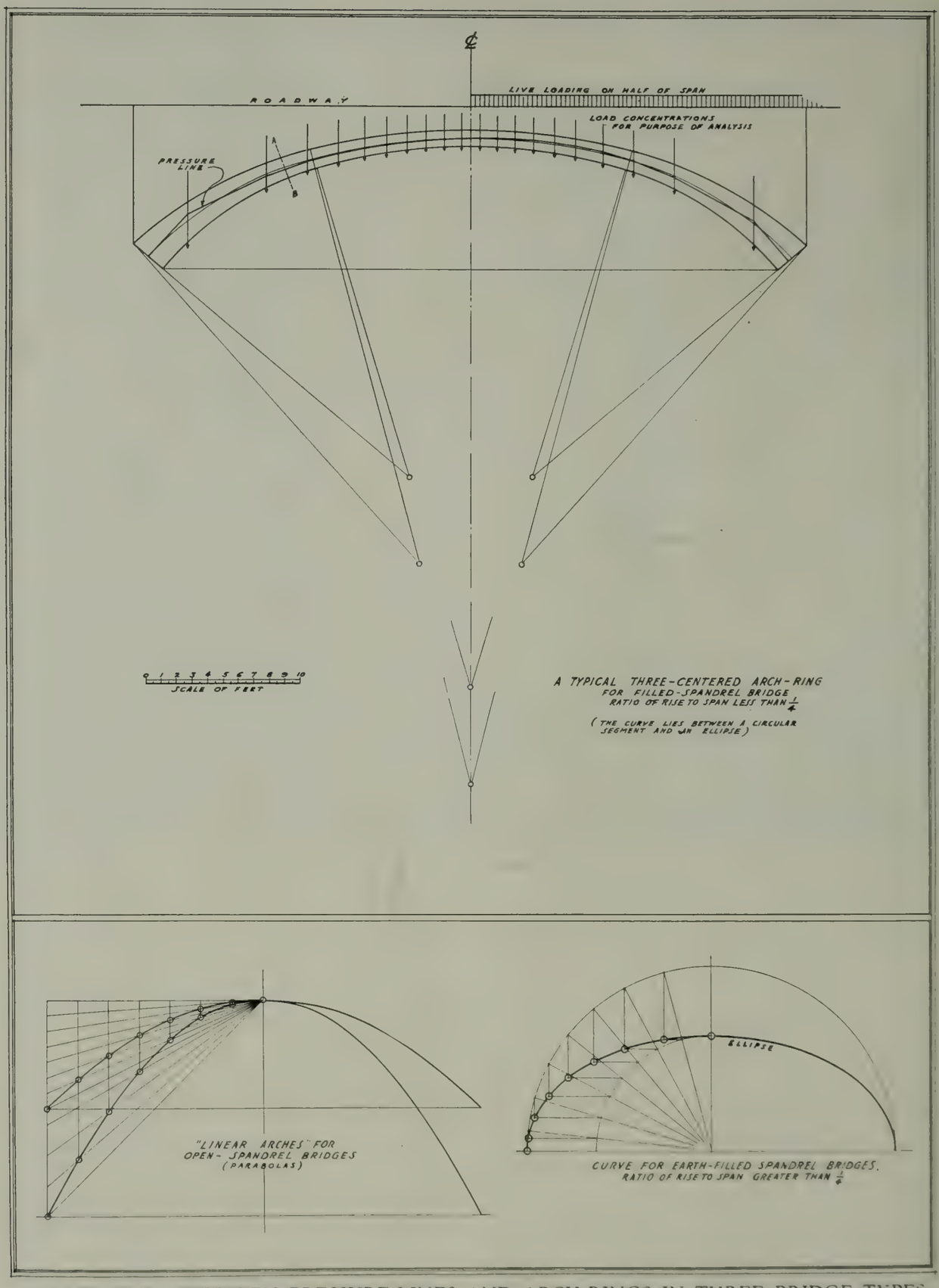
BY J. B. MASON

The graceful long-span arch bridge is coming more into its own and adds greater possibilities to artistic design. Spans of three and four hundred feet are still rare enough to be matters of comment, but how much greater a thrill there will be in the artistic realization of the 1,000 and 2,000 foot spans now considered possible! Through utilization of the hinge or semi-hinge construction, the foremost exponents of which have been Considere, Mesnager and Freyssinet, greatly increased arch spans will become possible. Freyssinet states that by the use of his method, and under the 1916 regulations of the French Department of Public Works, plain concrete arches of 1,100-foot span, and reinforced concrete arches of 2,700-foot span, can be constructed without especial difficulties.

Effect can be achieved through correctly proportioned arches. There is something of a sense of soaring across space, of a greyhound leaping ahead. No type is more beautiful as an expression of this idea than the bow-string arch bridge. It is in the conception of such soaring arches, rightly placed, artistically proportioned, that architects should find much new and absorbing work. Through use of slender members a delicate tracery in concrete may be produced in some bridge designs which is very beautiful. As the strength of this material is more fully utilized, the employment of more delicate and frail-appearing tracery will increase, offering still greater possibilities in the future for artistic architectural design.

A study of recommended practices for exterior concrete finishes for monolithic type buildings will give information of value in bridge work. Architects will find it advisable to detail conspicuous surfaces carefully. The contractor must be required to use the best grades of tongue-and-groove lumber of uniform width for forms, and must be instructed to lay these boards horizontally with joints well broken. Oils and other materials which may discolor the concrete should be specified against. Careful study of the structure should be made to determine the proper width of form boards to be used as it is very evident that too wide pieces tend to make a structure look heavy and clumsy, while too narrow pieces may dwarf the design.

As soon as forms are removed the concrete may be brushed down with a wire brush and touched up to remove fins and construction dirt and give the exposed surfaces a clean appearance. Grinding rough surfaces with a portable carborundum outfit will often serve to improve the appearance of the bridge materially. Application of a cement wash followed by rubbing is possibly the most satisfactory method to give the bridge a clean white appearance.



CORRELATION BETWEEN PRESSURE-LINES AND ARCH-RINGS IN THREE BRIDGE TYPES

DRAWING BY E. C. SEIBERT

(See article beginning on opposite page)



(See footnote for full credit)

THE DESIGN OF MASONRY ARCH BRIDGES

BY E. C. SEIBERT

Arch bridge design must, for best results, be the combined product of engineer and architect. Something beyond strict economy and efficiency is necessitated in the production of the highest degree of excellence, although it has been held that beauty resides in any useful structure designed on the lines of true economy, with the utmost simplicity and the fewest parts.

It must be borne in mind, however, that the design of a masonry arch is primarily an engineering matter, that the safe and economical curve of arch for any given set of conditions is fixed within narrow limits, and that, in the most common form of present-day masonry arch—the reinforced concrete structure—the proper disposition and proportioning of the steel reinforcement is a complex problem directly affecting the safety and economy of the structure.

An understanding of the fundamental action of an arch is necessary for the intelligent and successful treatment of its architectural features, for it is quite conceivable that an aesthetically sound design may be anything but structurally sufficient. A consideration of the action of an arch, and of the fixing of the arch curve, follows.

An arch is a means of resolving, generally speaking, vertical (or nearly vertical) loads into diagonal thrusts.

The "curve" of an arch is dependent upon several factors, to wit: nature of loading; nature of the "ends" and crown (e.g. whether fixed or hinged); the way in which loads are brought to the chief "working member," the arch-ring; and the external limitations of span and rise. The term "curve" as commonly applied to arches is loosely used. It generally denotes either the curve of the intrados or that of the axial line.

Arches may have a hinge at each abutment and at the crown; at each abutment; or at the crown only. The "hinge" has a mathematical advantage in constituting a "control point" in design, for the thrust line for any condition of loading passes through the center of a hinge. A three-hinged arch is statically determinate and the pressure line due to any loading may readily be determined; in an arch with less than three hinges the fixing of the pressure line is not so simple a matter, while a hingeless fixed-end arch is statically indeterminate in the full sense of the term.

The Niagara Bridge shown above was built by the Niagara Frontier Bridge Commission; George C. Diehl, Inc., Engineers; Waddell and Hardesty, Consultants; Cass Gilbert, Inc., Consult. Architect.



SPRING RIVER BRIDGE NEAR LOWELL, KAS.
A bow-string arch type of graceful design

Aesthetically, a hinge is distinctly detrimental. A hinge can carry no bending moment; in a rib with three hinges the deepest section is required nearly midway between the spring and crown hinges, the section decreasing in depth toward the hinges where thrust and shear, but no moment, are carried. A mental picture suffices to convey the generally unsatisfactory result. In justice, however, it must be admitted that under conditions of easily compressible foundations, the three-hinge type permits of relatively greater settlement without injury. Also, for instances in which the rise is less than ¼ the span, the three-hinged arch economically is the better, because of the relatively much higher temperature stresses in the "fixed" arch. Also, since the temperature stresses in a three-hinged arch are practically nothing, and since it is statically determinate, higher unit stresses may be used than in the solid arch.

The hinged arch may thus be dismissed as a somewhat unbeautiful utility, promoting economy at a not inconsiderable cost to the seeing eye.

As above stated, a fixed arch is statically indeterminate. The unknown quantities are six in number: the magnitude, direction, and point of application of the reaction at each support. The well-known three conditions for static equilibrium (namely that the algebraic summation of horizontal components of all external forces acting, of their vertical components, and of all moments, must each equal zero) furnish but three equations. The three additional equations necessary for the discovery, by mathematical processes, of the six unknowns, express the conditions that one end of the arch ring (taken as the mathematical origin of coordinates) has, due to the bending moments on the various sections, zero horizontal, vertical, and rotary moments.

Equations derived from the above conditions are not used directly in arch computations but are essential in the derivation of the necessary working formulas.

Instead of actually finding the magnitude, direction, and point of application of the reactions at the supports, it is simpler to find the thrust, shear, and moment at the



CAPPELEN MEMORIAL BRIDGE, MINNEAPOLIS

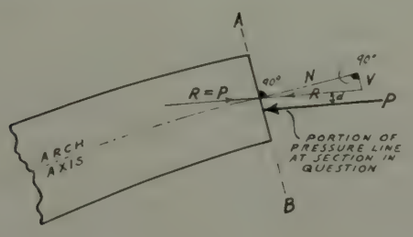
N. W. ELSBERG, CITY ENGINEER; K. OUSTAD, BRIDGE ENGINEER

A parabolic arch ring of excellent design. However, the use of a short-radius curve at the junction of the arch ring with the vertical line of the piers is criticized by Mr. Mason in his article on page 401, as a device that is generally ineffectual

crown. Having these, the equilibrium polygon under a given system of loads is drawn and the thrust, shear, and moment at any point may be found. This equilibrium polygon constitutes a picture of the internal forces acting on the ring. (In all arch theories the pressure line is assumed as coinciding with the equilibrium polygon. This is, practically speaking, true.)

If in designing an arch-ring, the equilibrium polygon for the given loads and the arch axis do not closely approach each other, further trial curves must be drawn until there is a close coincidence. The closer this coincidence, the lower the stresses in the ring.

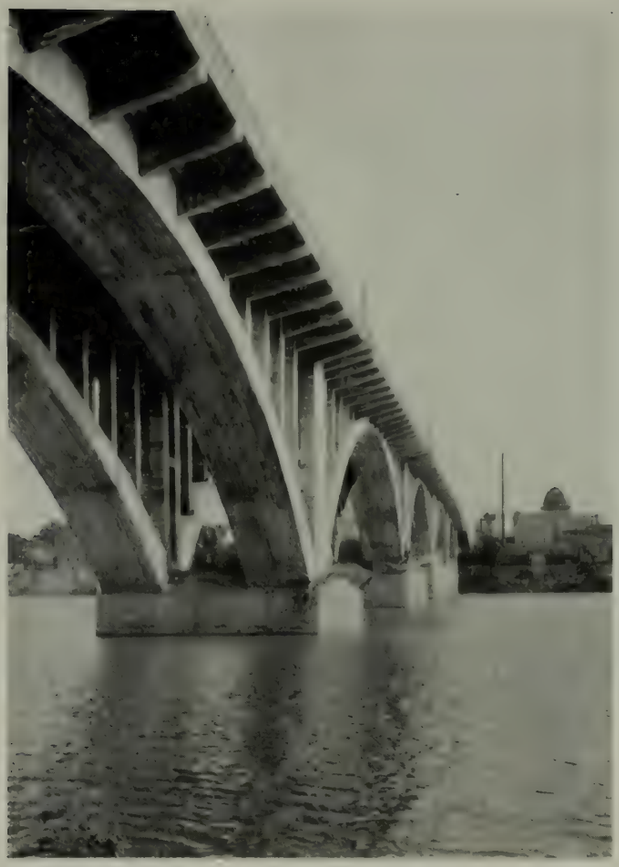
The magnitude and direction of the thrust at any particular section may be obtained by computation, or graphically. Consider



any such section A-B of the arch-ring shown in the drawing (page 402). An enlargement of this section in shown herewith, and conditions have been somewhat exaggerated for the sake of clearness. The resultant of all external forces is represented in magnitude and direction by P, which produces on the section in question a moment R d, a thrust N, and a shear V.

Now it is evident, upon examination of the figure, that the bending moment is zero at points where the equilibrium polygon intersects the arch axis, and furthermore, that if the equilibrium polygon is normal to a section, there will be no shear at that particular section. However, there is at least a thrust at every section.

In addition to the effects of the loads on an arch, tending to shorten the span of the arch, temperature changes tend to shorten the span when the temperature falls, and to lengthen it when the temperature rises. Now the tendency for the span to change its length, due to any cause, results in certain thrusts and moments. These vary with the form of the arch. In this connection, suffice it to say that in general, these effects are greater for a flat arch, as are the effects of loadings, and that formulae for their determination have been developed, and are available in any good treatise.



MAIN STREET BRIDGE, LITTLE ROCK, ARK.
DANIEL B. LUTEN, ENGINEER

A parabolic arch type. Photo taken shortly after flood water had subsided, leaving abutments piled with debris. A minor fault in a good design.

●

It is well known that a thrust acting outside of the middle third of a section causes a tendency to tension. Of course, in a masonry arch of material or construction incapable of taking tension, the design must be such as to keep the thrust within the middle third, but in concrete, sections may be, and generally are, designed for tension by the inclusion of steel reinforcement, at both the top and bottom.

From the above, it will be evident that the curve of the axial line of an arch should conform as nearly as possible to the "pressure line" under the given load system. Now each condition of loading in a highway or railroad bridge produces its own pressure line. If a load moves across a bridge, the pressure line continually changes with the progress of the load. Hence no arch curve can satisfy perfectly all load conditions; the best curve, generally, is that which most nearly coincides with the mean of all possible pressure curves.

The two "linear" arches or pressure lines obtaining under common conditions of dead loading are the parabola and the transformed catenary. For equal load concentrations, equally spaced, the linear arch closely coincides with a parabola whose vertex is at the crown; this curve is exemplified by the open-spandrel bridges.

When the dead load along the rib varies in direct proportion to the distance between a horizontal line and the arch-ring, which is approximately the dead load condition in a filled spandrel arch, the linear arch assumes the shape of a transformed catenary.

The two curves above referred to are those obtaining under dead loads alone, and may be more or less modified by live load effects. Actually, load conditions are in practically all cases such as to render the use of one of the following curves satisfactory: for open spandrel arches, a parabola; for earth-filled arches having a ratio of rise to span greater than ¼, an ellipse; for earth-filled arches having a ratio of rise to span of less than ¼, the best curve lies between a circular segment and an ellipse, and may be approximated by a three-centered intrados.

For the sake of appearance, the parabolic curve is sometimes modified by short circular curves at its ends, made tangent to the parabola and to the vertical line of the pier or abutment. Such minor curves are not effective, and in no case should be considered as part of the arch rise.

In highway bridges the following live load conditions are generally used in determining the maximum effects: first, live load covering the entire span, and second, the load covering but one-half the span. Or, by computing a table for the thrusts and moments due to a load of unity at different points, or by the use of influence lines, the exact loading to cause maximum stresses may be determined. Of course, the dead load stresses are always to be considered in conjunction with those from moving loads.

In judging the fitness and beauty of an arch bridge, the pleasing and load carrying qualities of the curve of the arch-ring are not the only considerations. The following points, placed in an order not necessarily one of relative importance, must be considered by the designer:

(a) Adequacy of waterway. Also, is the form such as to catch debris at high water?
(b) Adequacy of head-room.
(c) Is the design the most economical and appropriate one for the natural conditions at the site?
(d) Is the type the most suitable for the loading?
(e) Does the bridge bespeak the character of the community?
(f) Does it harmonize with surroundings, as regards the rugged, ornamental, or simple character of surrounding country?
(g) Is it symmetrical in the proper sense of the term? If not geometrically symmetrical, is its general shape adapted to the natural profile of the waterway and valley it spans?
(h) Does it convey an impression of strength, and of proper use of materials?
(i) Is there an incongruous combination of trusses with girders?
(j) Does each arch of a multiple-arch bridge harmonize with the others? Are "full centered" (springing from horizontal beds) spans adjacent to skewbacks (springing from inclined beds)?
(k) Is the roadway agreeably cambered? (A flat parabola is very agreeable).
(l) Are piers pleasingly proportioned, and do they have efficient lines for minimum practicable resistance to the flow?
(m) Is the arch-ring correctly and gracefully proportioned and is it properly accentuated in a manner in keeping with its importance?
(n) Is there a "dominating" span?
(o) Do the abutments have the appearance of ample strength?
(p) Are inappropriate figures, or other inappropriate ornamentation used, such as keystones and imitation voussoirs?
(q) In open spandrel bridges, is there an appropriate increase in the distance between columns, from the crown toward the springing lines?
(r) Is the railing adequate for protection to traffic and is it in keeping with the general character of the structure?
(s) Do pedestals appear to be developments of the piers and abutments?
(t) Are lamps in keeping with the general design, and are they pleasingly spaced?

The above points need not be elaborated upon. They are suggestive of the multiplicity of items requiring consideration in the architectural development of the arch bridge.



KILL VAN KULL BRIDGE, BAYONNE, N. J., TO PORT RICHMOND, STATEN ISLAND. BUILT BY THE PORT OF NEW YORK AUTHORITY
O. H. AMMANN, BRIDGE ENGINEER CASS GILBERT, INC., ARCHITECT



Photo. Abbott

VIEW OF TOWER UNDER CONSTRUCTION

HUDSON RIVER SUSPENSION BRIDGE, NEW YORK CITY

Built by the Port of New York Authority

O. H. AMMANN, BRIDGE ENGINEER CASS GILBERT, INC., ARCHITECT



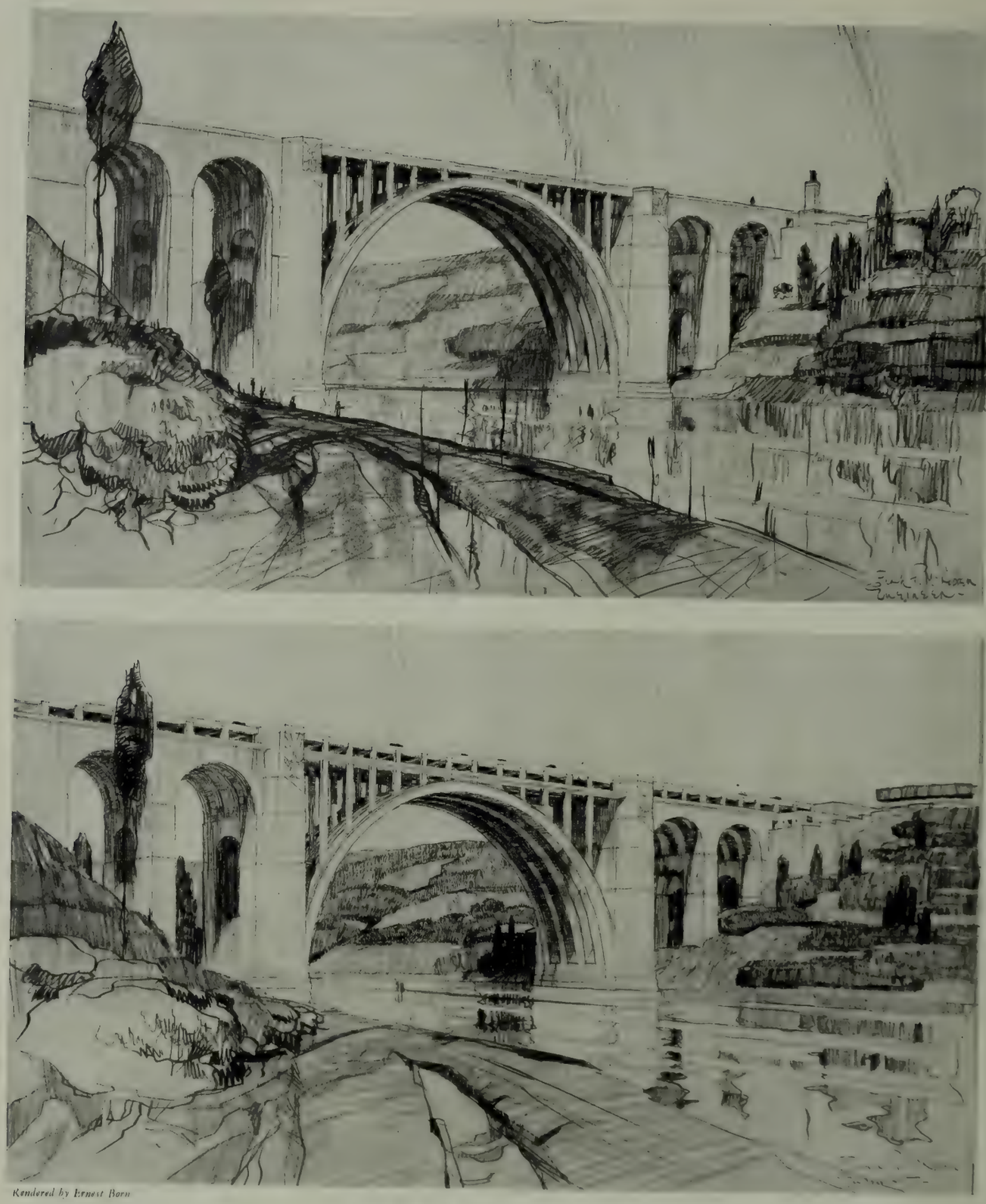
Photo. Abbott

DETAIL OF STRUCTURAL STEEL

HUDSON RIVER SUSPENSION BRIDGE, NEW YORK CITY

Built by the Port of New York Authority

O. H. AMMANN, BRIDGE ENGINEER CASS GILBERT, INC., ARCHITECT



Rendered by Ernest Born

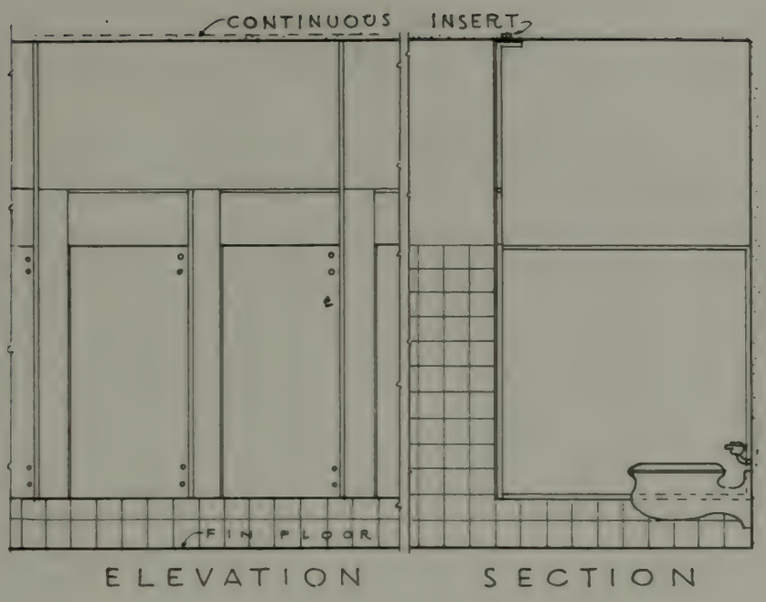
STUDIES FOR RIDGE ROAD BRIDGE

OVER THE GENESSEE RIVER, ROCHESTER, NEW YORK

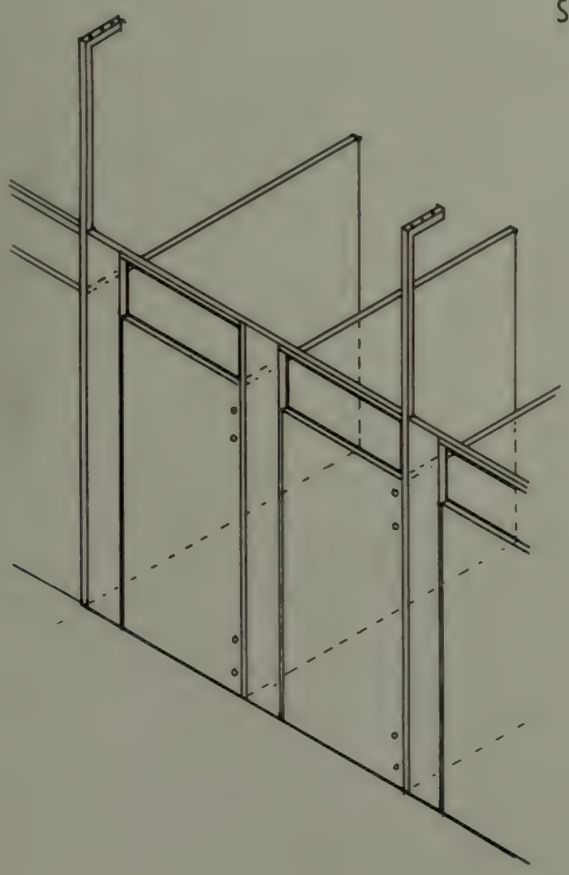
GEHRON AND ROSS, ARCHITECTS, FRANK P. MC KIBBEN, ENGINEER

Both of these studies are made for concrete construction throughout. The top design is for a single deck roadway, and the lower design is for a double deck roadway, which was abandoned on account of the difficulties at the approaches. This bridge is now being built with closed spandrels and is being faced with granite

NOTES ON DRAFTING AND DESIGN



SUSPENDED METAL STALL PARTITIONS
K. L H. SYSTEM

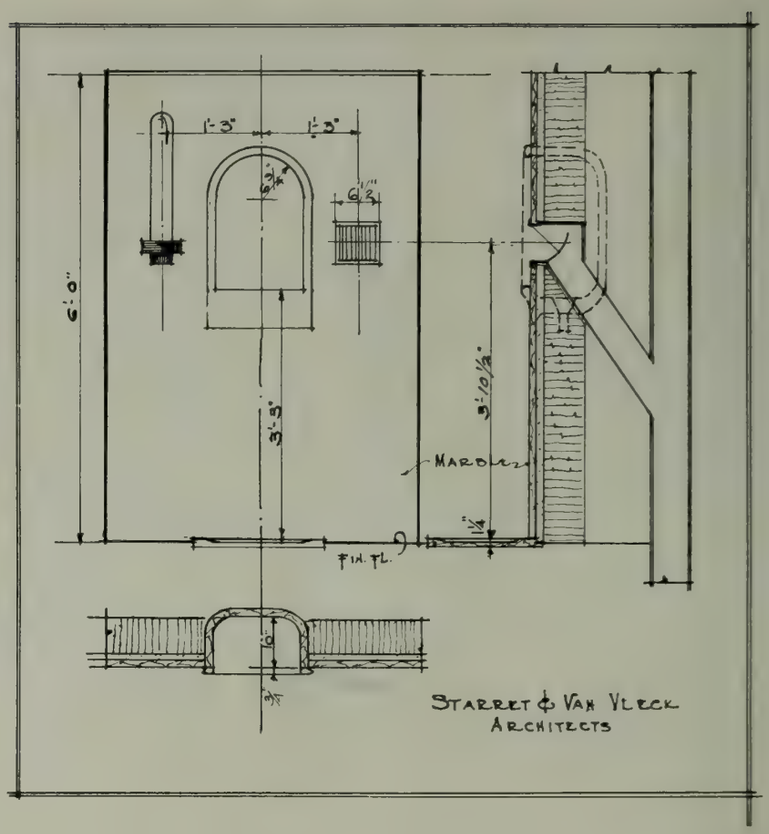


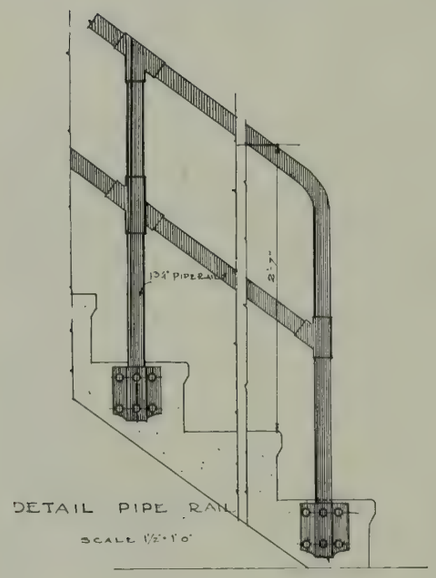
HANG IT

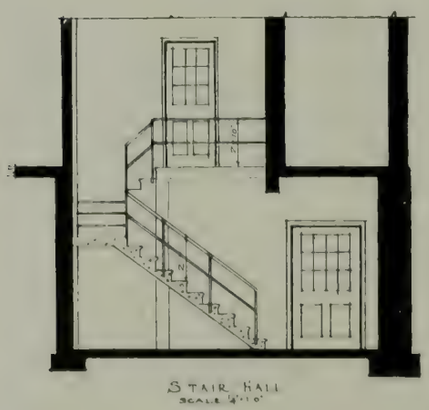
Toilet floors must be easily cleaned. Any construction that makes for unsanitary dirt-corners should therefore be avoided. Wall-hung closets, lavatories, etc., and metal stall partitions suspended from the ceiling leave the floor free for any obstructions to efficient cleaning. K. Lönberg-Holm, Architect.

DISCARD FOR DRINKING CUPS

To avoid the accumulation of used paper drinking cups adjacent to the drinking fountains in public hallways and offices, chutes should be built into walls. A barrel at the bottom of the chute gathers cup litter at one place and does away with janitor service required to empty baskets usually placed at each drinking fountain. Design by Starret and Van Vleck, Architects, New York City.







WHY WORK SO HARD DRAFTING?

The 1½″ scale detail of a stair rail at the left represents 1 hour's work on the drafting board. The detail does not give any essential information that is not already given on the ¼″ section or which could not be covered in the specification with a few words: "Rails to be two-pipe 1¾″ pipe rail."

Furthermore the detail might prevent the contractor from using more satisfactory welded connections or simpler flange attachments.

A large part of the working drawings required for the erection of present day structures are prepared in the architect's office.

A number of units that enter into the finished structure are not detailed by the architect nor shown on his drawings. They are covered by the specification either stating requirements or allowing choice among a given number of standard products. This includes mechanical and sanitary fixtures, structural units, hardware.

The increasing specialization of the building industry makes it possible to extend this procedure to a number of units that quite often are detailed in the architect's office: doors, windows, stairs, toilet stalls, unit partitions, trim, skylights, louvres, grilles, rails.

The detailing of these units not only requires a great amount of work in the drafting room but often ties down the contractor to possibly obsolete and expensive details copied from previous jobs. The architect, furthermore, is not able to get the full benefit of the expert advice and specialized experience of the contracting firm.

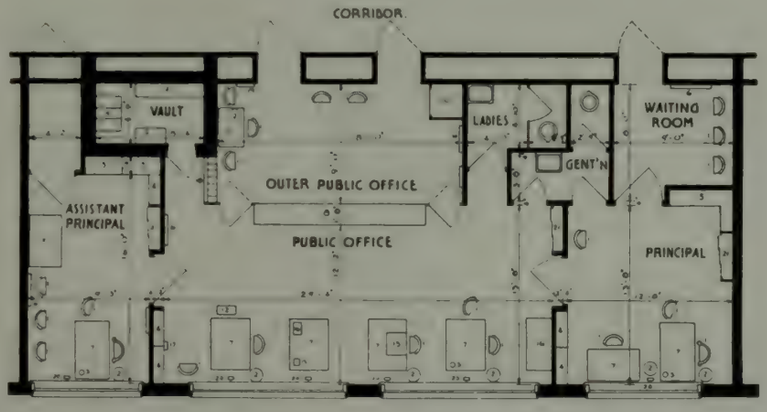
The contractor has to prepare shop drawings. He should be free to offer suggestions that meet the specified requirements. Eliminating unnecessary repetition, the architect can limit his work to the specification, the selection of manufacturer and product, and the approval of shop drawings, including the checking of these drawings against the specification and the related building work. Changes can be made without tedious voiding and changing of the original drawings.

Any special feature or minor changes from the specified standards can very well be covered in the specification. The drafting work in the architect's office can be limited to diagrammatical lay-outs and schedules giving basic dimensions, types, operation, finish.



SCHOOL OFFICES A UNIT

Space can be conserved and the control of teaching functions furthered by concentrating all school administrative offices with their equipment in one compact unit. The scheme here illustrated was originated by Professor N. L. Engelhardt, Teachers College, Columbia University, in co-operation with an architect.



1 CHAIR
2 PAPER BASKET
3 TELEPHONE
4 FILING CABINET
5 BOOKS
6 BULLETIN BOARD
7 OFFICE DESK
8 COUNTER
9 SHELF
10 TELEPHONE BOOTH
11 TABLE
12 SWITCH BOARD
13 TYPEWRITER
14 LONGCARRIAGE TYPEWRITER
15 ADDING MACHINE
16 MIMEOGRAPH
17 WALL CLOCK
18 MAIL BOX
19 KEY BOARD
20 BASE BLOCK
21 CLOAK SPACE

ADMINISTRATIVE SUITE FOR HIGH SCHOOL

THE ALLIED ARTS:

Three Interiors



Photo. Danielson

OFFICE OF STRAUSS AND COMPANY, NEW YORK CITY

WHITMAN AND GOODMAN, ARCHITECTS

The woods employed are *avadoire* (pale yellow in color) and redwood burl; chairs nickel-plated and upholstered in green leather; the carpet is green.



Photo. Danteison

OFFICE OF STRAUSS AND COMPANY, NEW YORK CITY

WHITMAN AND GOODMAN, ARCHITECTS



Photo. Van Anda



Photo. Worsinger

Above:
JOHN BECKER'S ART GALLERY, NEW YORK CITY
WOLFGANG AND POLA HOFFMANN, ARCHITECTS

Picture panels in natural Monk's cloth; room is in various shades of tan and brown.

Below:
DINING ROOM APARTMENT, NEW YORK CITY
DONALD DESKEY, DESIGNER

CURRENT ARCHITECTURE



Photo: Sigurd Fischer

THE ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.
YORK AND SAWYER, ARCHITECTS

Featuring

THE ARNOT OGDEN HOSPITAL

THE BETH ISRAEL HOSPITAL

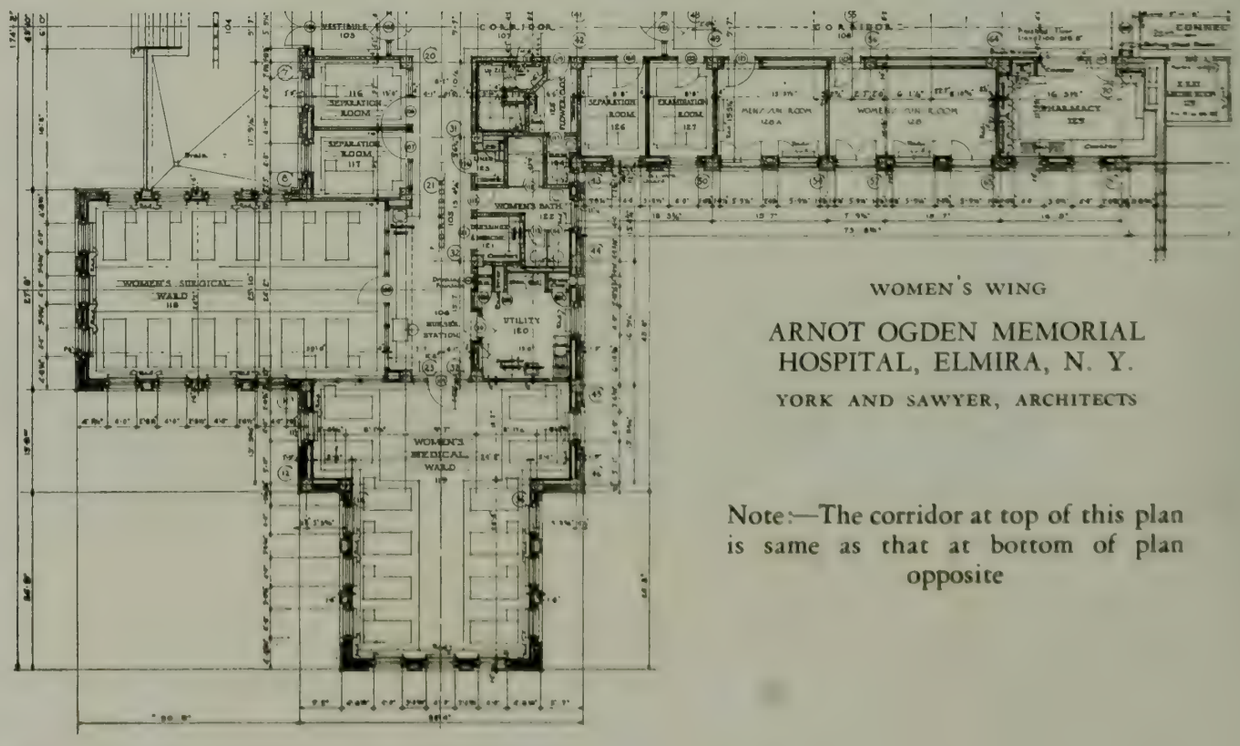
THE SYDENHAM HOSPITAL

ALTERATIONS IN THE HOTEL ADOLPHUS



Photo. Sigurd Fischer

WOMEN'S SURGICAL WARD



WOMEN'S WING

ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.

YORK AND SAWYER, ARCHITECTS

Note:—The corridor at top of this plan is same as that at bottom of plan opposite



Photo Sigurd Fischer

Above: MEN'S MEDICAL WARD

ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.

YORK AND SAWYER, ARCHITECTS

Below: PLAN OF MEN'S WING

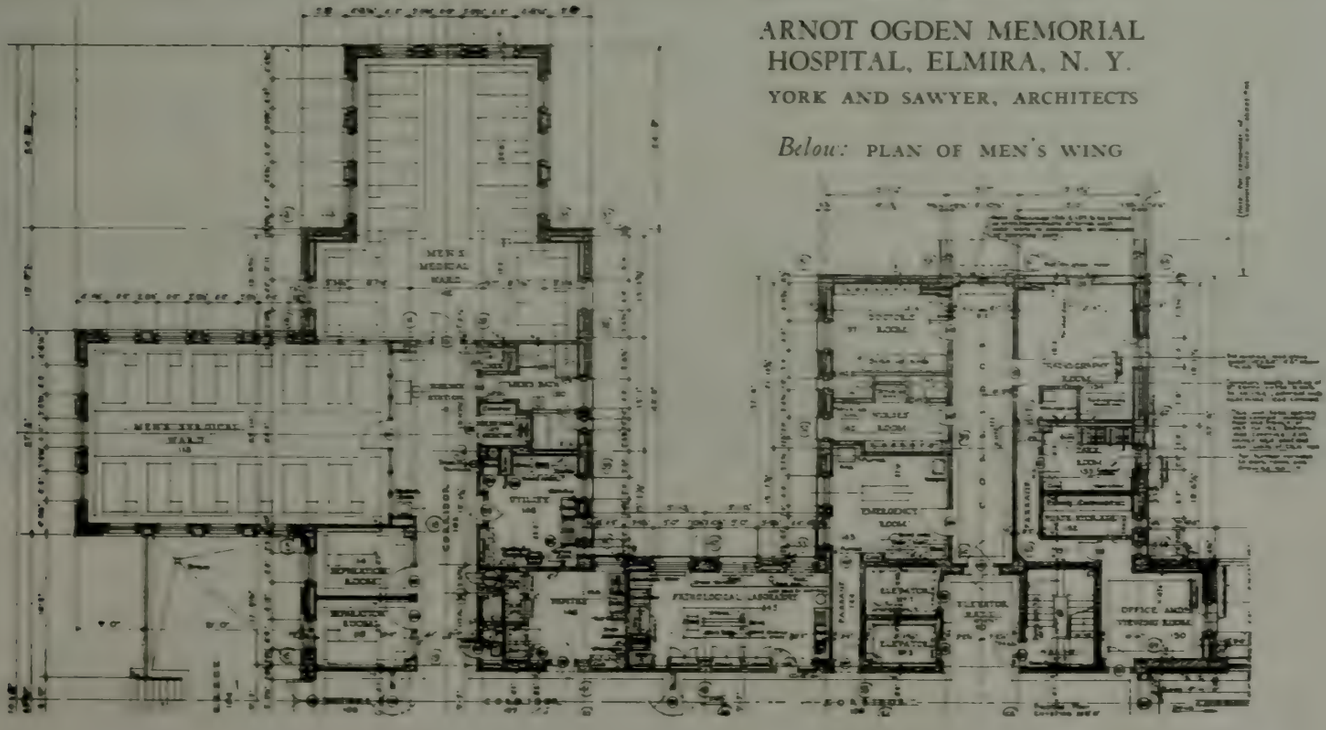




Photo. Sigurd Fischer

CHILDREN'S WARD

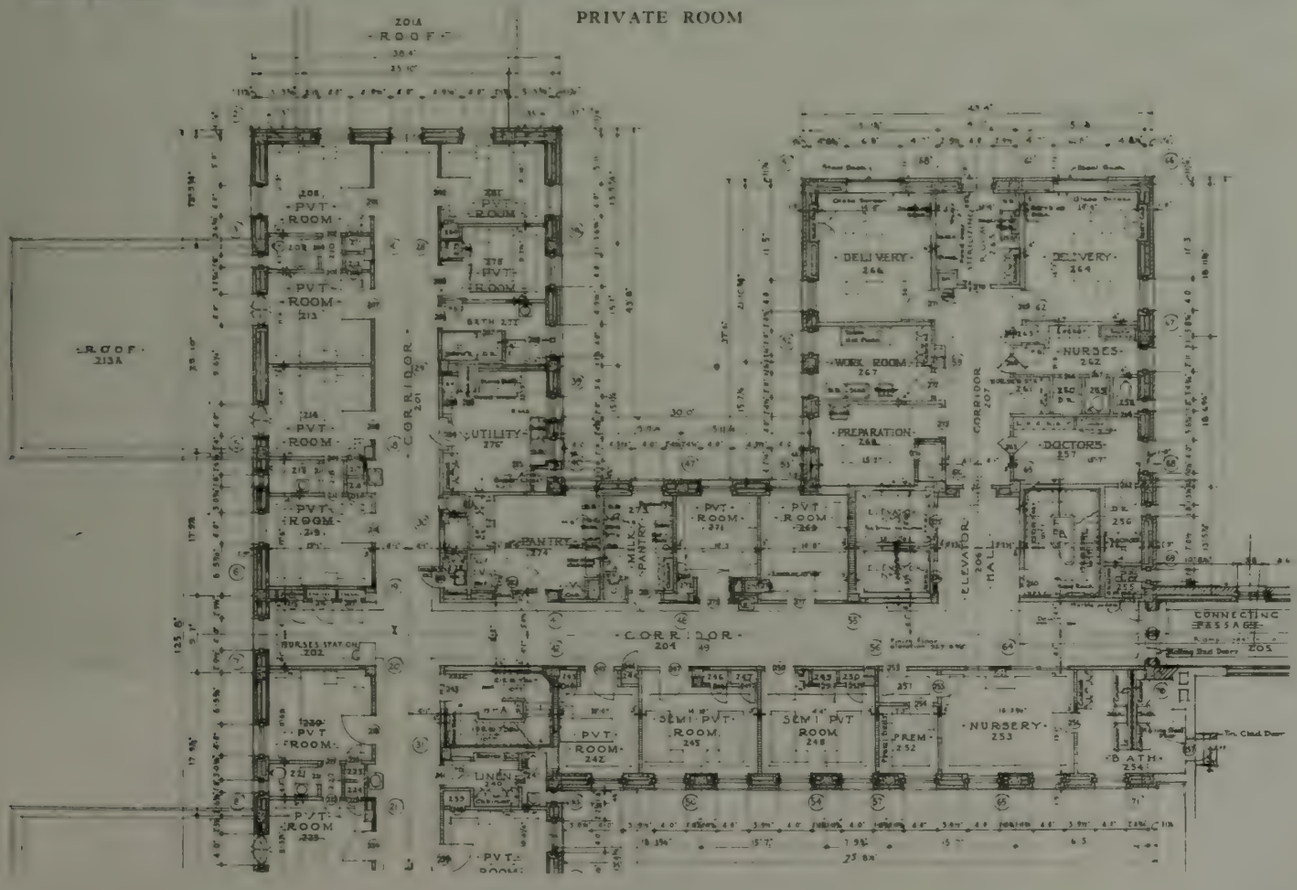
ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.

YORK AND SAWYER, ARCHITECTS



Photo Sigurd Fischer

PRIVATE ROOM



SECOND FLOOR PLAN, PAVILION



Photo. Sigurd Fischer

NURSES' DINING ROOM

ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.

YORK AND SAWYER, ARCHITECTS

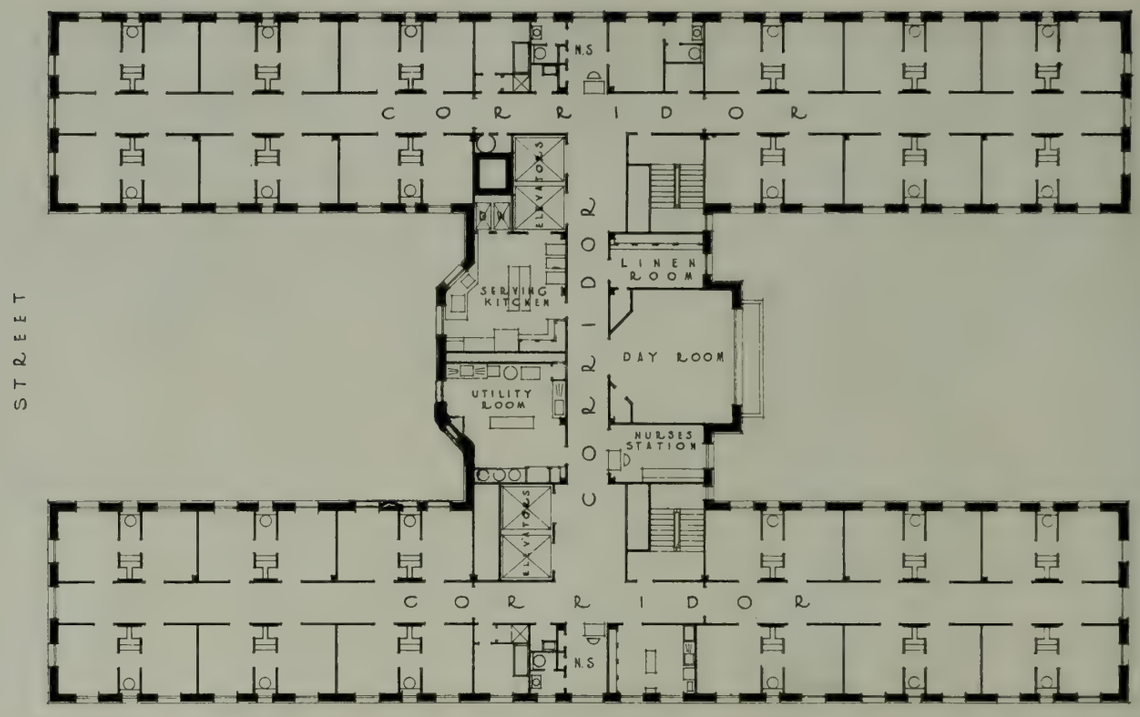


Photo. Sigurd Fischer

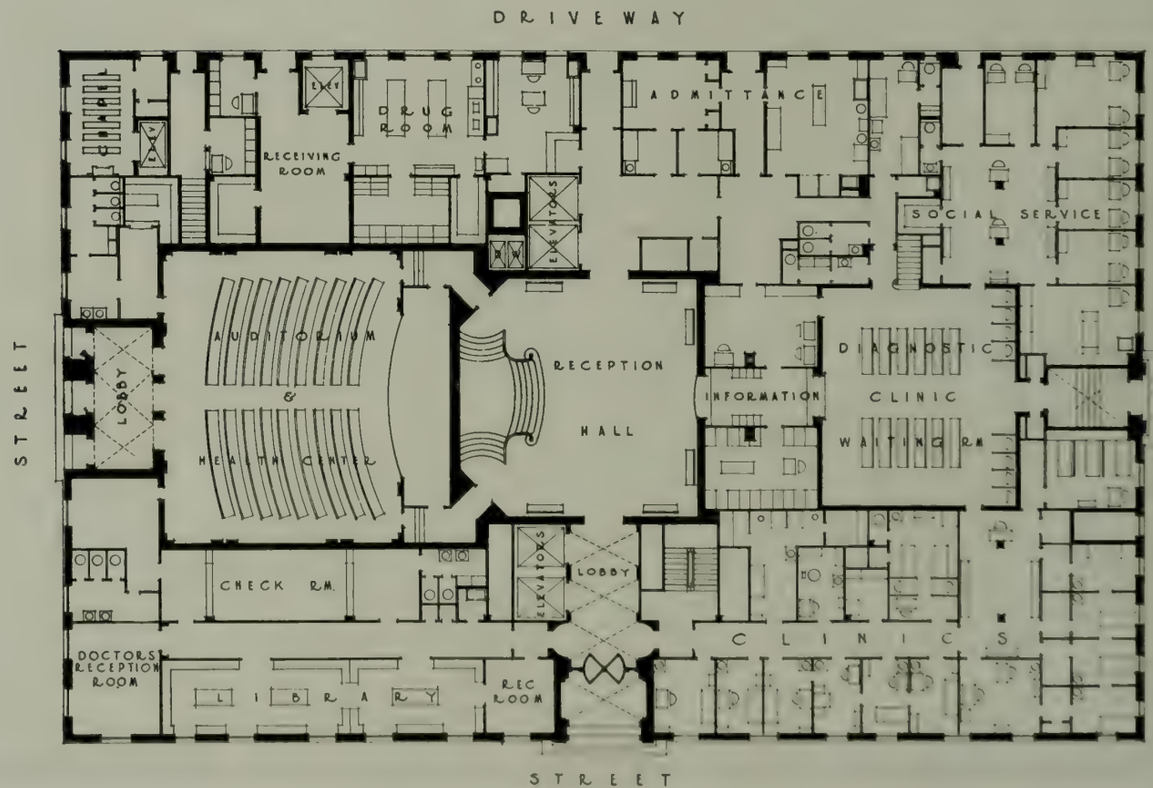
NURSES' STATION

ARNOT OGDEN MEMORIAL HOSPITAL, ELMIRA, N. Y.

YORK AND SAWYER, ARCHITECTS



TYPICAL FLOOR PLAN



FIRST FLOOR PLAN

BETH ISRAEL HOSPITAL, NEW YORK CITY

LOUIS ALLEN ABRAMSON, ARCHITECT



Photo. M. Rosenblath

BETH ISRAEL HOSPITAL, NEW YORK CITY

LOUIS ALLEN ABRAMSON, ARCHITECT



Photo. M. Rosenbluth

TYPICAL CORRIDOR

BETH ISRAEL HOSPITAL, NEW YORK CITY

LOUIS ALLEN ABRAMSON, ARCHITECT

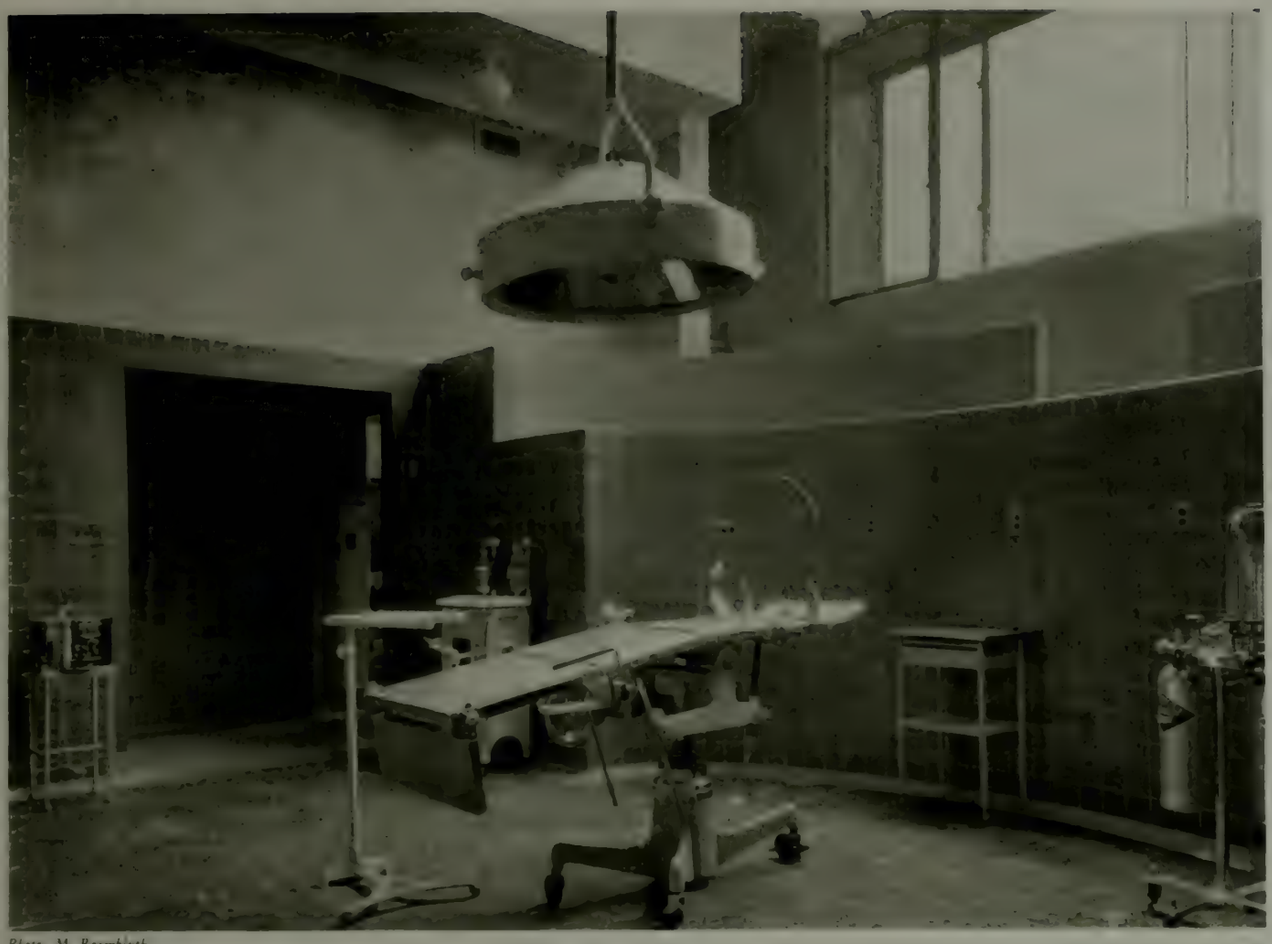
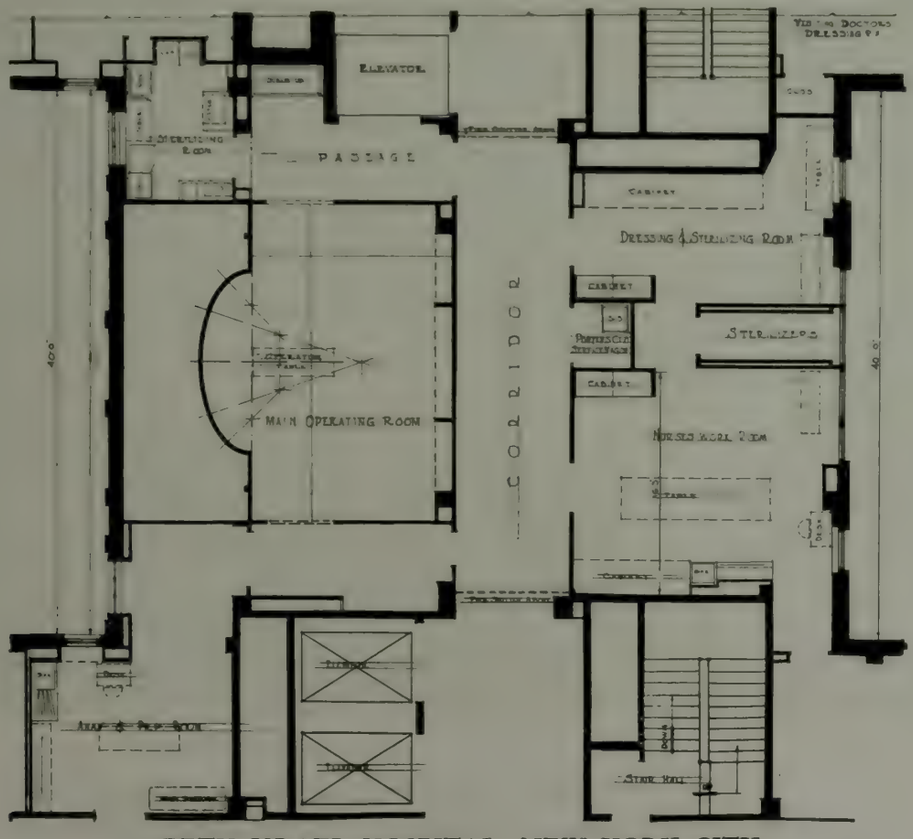


Photo. M. Rosenbluth

MAIN OPERATING ROOM



BETH ISRAEL HOSPITAL, NEW YORK CITY

LOUIS ALLEN ABRAMSON, ARCHITECT



Photo. M. Rosenbluth

SYDENHAM HOSPITAL, NEW YORK CITY

CHARLES B. MEYERS, ARCHITECT



Photo. Langley

THE DANISH ROOM CHIMNEY PIECE

ALTERATIONS IN THE HOTEL ADOLPHUS, DALLAS, TEXAS

RALPH COLE HALL AND VICTOR PROETZ, ARCHITECTS

BRYANT AND SHARP, ASSOCIATE ARCHITECTS



Photo. Langley

THE DANISH ROOM

ALTERATIONS IN THE HOTEL ADOLPHUS, DALLAS, TEXAS

RALPH COLE HALL AND VICTOR PROETZ, ARCHITECTS

BRYANT AND SHARP, ASSOCIATE ARCHITECTS



Photo. Langley

THE DANISH ROOM DOORS

ALTERATIONS IN THE HOTEL ADOLPHUS, DALLAS, TEXAS

RALPH COLE HALL AND VICTOR PROETZ, ARCHITECTS

BRYANT AND SHARP, ASSOCIATE ARCHITECTS



Photo. Langley

THE WHITE ROOM, DOORS INTO THE YELLOW ROOM

ALTERATIONS IN THE HOTEL ADOLPHUS, DALLAS, TEXAS

RALPH COLE HALL AND VICTOR PROETZ, ARCHITECTS

BRYANT AND SHARP, ASSOCIATE ARCHITECTS

THE DEMONSTRATION HEALTH-HOUSE, LOS ANGELES

RICHARD J. NEUTRA, ARCHITECT

THE ARCHITECTURAL PROBLEM

The building was to serve as the home of a very sociable family with educational interests and an active preference for the out-of-doors. A non-profit-making experimental open-air school was attached to the residential building program.

A southern hillside was chosen, located in the immediate vicinity of a huge mountainous municipal park-reserve and commanding a magnificent view of the distant ocean.

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PROFESSIONAL SERVICE

In order to make all elements of the conception effective (since in experimental work everything depends on the minutest detail), all planning, designing, structural and architectural drafting, all the detailing of built-in equipment and furniture, the landscaping, the supervision, and even a continuous book survey—were handled by the architect.

•

CONSTRUCTION

A light-weight steel frame of standard sections was erected on a unit plan, the divisions of which accorded with the size of the selected stock steel casements (see plans), with their standardized cross-sections and spandrel-beam lengths. All the numerous porches and balconies were suspended from the roof level, in order to avoid the scattering of depth requiring cantilever construction on the different floor levels. Supporting balcony brackets were excluded because their side thrusts would produce undesirable bending moments in the slender steel posts. All spandrel-to-column connections are stiffened by 12″ wingplates to secure further earthquake resistance. Joists are bar trusses electrically welded. All outside walls are of 3.6″ expanded metal reinforcing with 1¼″ of dense concrete shot from an air-compression gun. All inside partitions are of metal lath and plaster.

Foundations, retaining walls, and the framework of the suspended swimming tank are of reinforced concrete. Walls of the handball courts and the open-air theatre have structural pipe construction with reinforced shot concrete as described above.

•

EQUIPMENT

Comprehensive sprinkling system for roof and balcony flower-containers and over the whole estate, with concentrated control in the patio. Gas-fired incinerator with hopper door on drain-board. Revolving cooler; electric dishwasher and kitchen aids. Housephones and annunciator system; four dynamic loudspeakers with remote control. Electrically controlled hot-air system, with cold-air return. Electric heaters. Hydraulically controlled overhead garage doors. Gasoline tank and pump, capacity 280 gallons. Inset ceiling lights; indirect lighting of living quarters.

Plate glass, ultra-violet-ray glass; opaque-glass wainscots; glass and tile floors; heavy linoleum; broadloom carpet in downstairs living room and study. Walls covered with washable canvas. All hardware and metal parts chromium nickel. Two long one-piece drainboards in shop-cast "petrium"; Bakelite tops for kitchen and other tables.

•

COLOR

Exterior nearly white; exposed steel, battleship gray. Planting in balcony containers, at pergolas and on grounds adjoining the building, in tones of pale blue and purple, with nearly permanent blooming: *Ceanotus spinosus*, *Plaumbago capensis*, *Bougainvillea crimson-lake*. Yellow flowering shrubs and trees framing the blue distant view of the ocean: varieties of *Accacia*, *Cassia*, *Genista*.



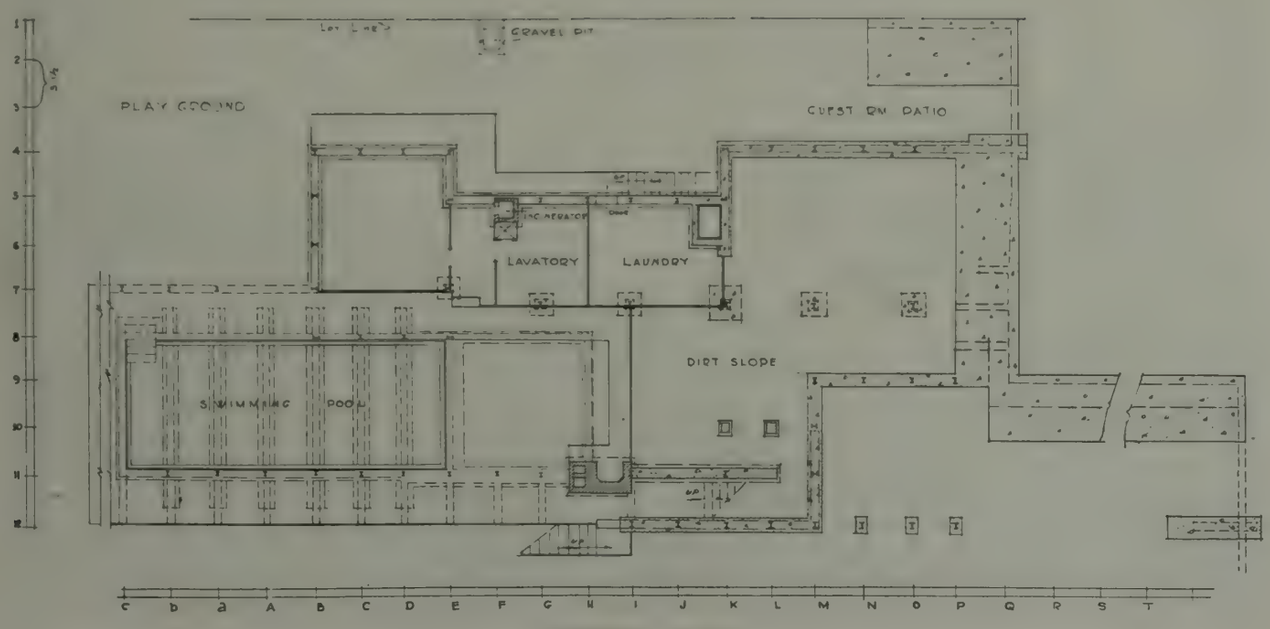
DETAIL VIEW FROM WEST SIDE

DEMONSTRATION HEALTH-HOUSE FOR DR. PHILIP LOVELL, LOS ANGELES

RICHARD J. NEUTRA, ARCHITECT



MAIN ENTRANCE



BASEMENT PLAN

DEMONSTRATION HEALTH-HOUSE FOR DR. PHILIP LOVELL, LOS ANGELES

RICHARD NEUTRA, ARCHITECT



VIEW FROM SOUTH



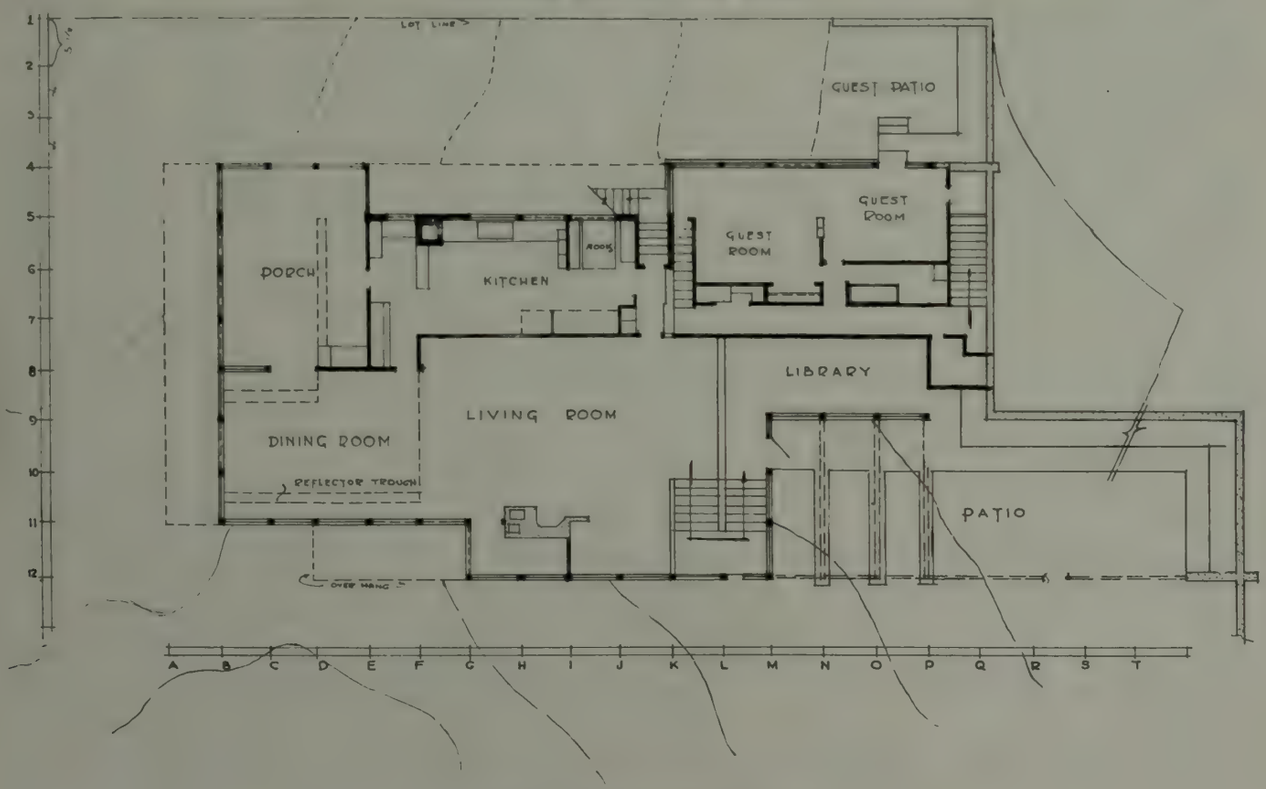
VIEW FROM SOUTH WEST

DEMONSTRATION HEALTH-HOUSE FOR DR. PHILIP LOVELL, LOS ANGELES

RICHARD NEUTRA, ARCHITECT



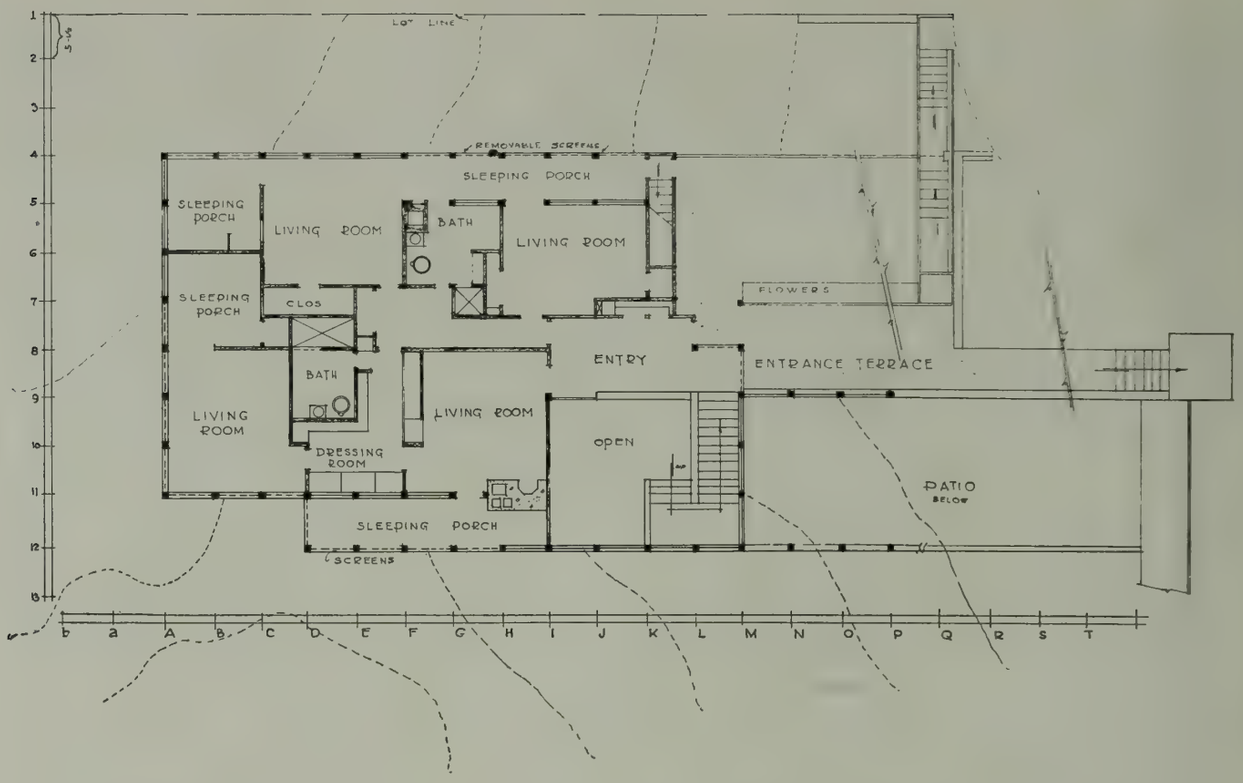
BED-ROOM AND PRIVATE OFFICE



LIVING-ROOM FLOOR PLAN

DEMONSTRATION HEALTH-HOUSE FOR DR. PHILIP LOVELL, LOS ANGELES

RICHARD J. NEUTRA, ARCHITECT



THIRD FLOOR PLAN

INTERIOR COLOR SCHEME

In downstairs living quarters: silver-gray carpets; wood furniture in dark gray lacquer; metal furniture chrome nickel. Hangings plain cobalt blue; flat goat-hair fabrics.

Upstairs living quarters: aluminum lacquer, bright yellow hangings, light gray plain linoleum. Bath and kitchen, light gray enamel and white opaque- lass wainscots. White vitrified tile and glass floors.



At Right: DESK AND DRESSING TABLE

DEMONSTRATION HEALTH-HOUSE, LOS ANGELES

RICHARD J. NEUTRA, ARCHITECT



BATH ROOM

DEMONSTRATION HEALTH-HOUSE FOR DR. PHILIP LOVELL, LOS ANGELES

RICHARD NEUTRA, ARCHITECT



A DESIGN FOR A FILM SET OF THE FUTURE
BY E. CARRICK

MOVING PICTURE SETS—

A Medium for the Architect

BY EDWARD CARRICK

Many architects whom I have met think there is no art in the films, and then it turns out that they go to see about five films a year and generally strike "dud" performances. An architect who has seen films such as *Doctor Caligari*, *The Student of Prague*, *The Thief of Bagdad*, *A Woman of Paris*, *Siegfried*, *Metropolis*, *Ten Days That Shook the World*, *The Fall of St. Petersburg*, and *Potemkin*, cannot but admit that the moving picture is perhaps one of the greatest mediums for expression that has yet been used. In some films the art direction rests wholly in the building and lighting of a door, a window, or the corner of a street. In others, like *Metropolis*, and *Secrets of the East*, the art director has just given flight to his imagination: the first picture showing a world of the future, and the second a world of the imaginary past. It was by the simplest of devices and minimum expense that scenes such as those in *Metropolis* were made.

"Art Director" is the name generally given to him who designs, furnishes, decorates and arranges the scenes or backgrounds of a film in harmony with the general characteristics of the drama which is being represented, so that its atmosphere and artistic qualities help the action to register sentiments among the audience. One day the art director and producer will be one and the same person. At present, in most countries, they are two people, and as the producer comes first, the art director has to help to express the producer's ideas or give him ideas to express. In Germany, well-known artists such as Klaus Richter are art directors, and when they make designs for scenes they show the action taking place in them and sometimes also make details of the action.

When a scene is set it is the art director who arranges the folds of the curtains, who places the bowl of flowers, or arranges an ink stand, so that when the critical moment comes for a "close-up" these simple things become of intense atmospheric value.

The departments in a film studio that come under his command are the following: carpentry and joinery, plasterwork, model-making (a very important branch and often overlooked), furniture and properties, decorating, trickwork and sometimes costume designing, but that seldom, except when historical accuracy is required. His materi-



FROM A CAVALCANTI'S PRODUCTION "EN RADE"

A scene by the French artist Eric Ars. Here it will be noticed how innumerable little subtleties go to make a dramatic picture.

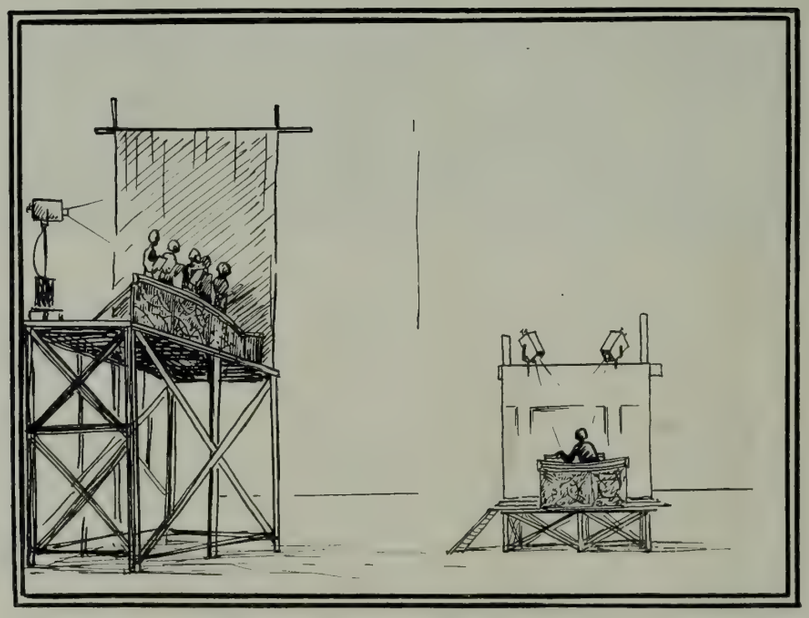
als can be anything he chooses; but those used in the chief European studios are plywood, planks and all sized timbers, wire netting, sackcloth, plaster, sawdust, paper, paint, and all the usual wood mouldings. In Germany the plaster shops are brought to great perfection and they think nothing of taking moulds of Italian 16th century carved panelling and casting the whole thing in plaster.

Perhaps the most interesting and exciting work that is handled by the art director and in which architects of imagination would shine is what is known as process work. There have been many kinds of "processes" used in the past, such as the *glass process* and the *model process*, but they have all been defective; whereas now the Germans have patented a new method, the *Schufftan Process*, which is the cleverest little invention going, for it permits one to build the streets of Babylon, or one of Piranesi's prisons, at little more than the cost of the materials in an ordinary drawing-room set.

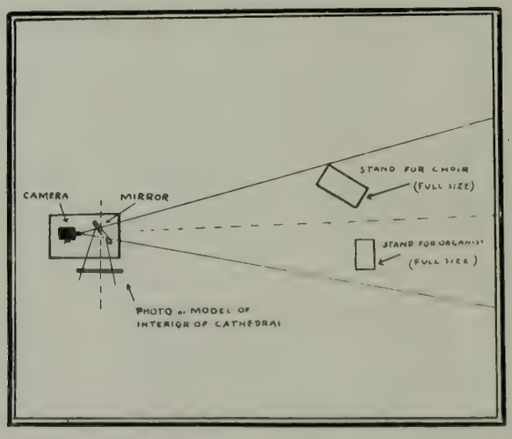
The Schufftan process, because of its simplicity and ingenuity, is really worth describing. If, for example, you wanted to represent the celebrated episode of Benvenuto Cellini escaping over the battlements of the Castle of St. Angelo in Rome, you would then make a very perfectly detailed model, or get a perfect photograph, of the castle of St. Angelo. This model you light realistically, and if you like you can have cloud effects achieved by means of smoke or a projector. The whole thing you reflect in a sheet of looking-glass at a



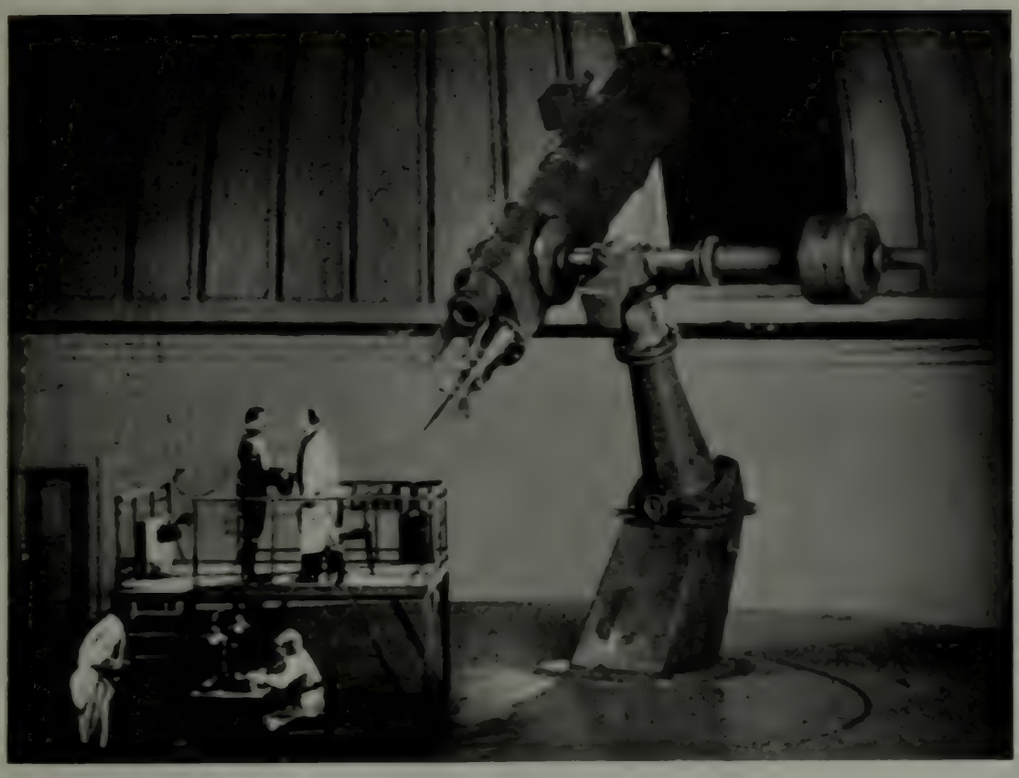
A rather unusual shot of a cathedral choir in which the Schufftan Process has been used. A photograph of the actual cathedral was made and reflected into the mirror and at the parts where the choir and organist are seen the mirror was scraped away and two platforms were built at a distance behind the mirror to take them, thus filling the spaces.



All that was actually built for the cathedral choir set



Plan showing positions of camera, mirror, photograph and platforms



A SCHUFFTAN PROCESS SET

Only the rostrum where people are standing is real, the remainder is all model. For the telescope an ordinary 12-inch microscope was used.



Stage, proscenium and orchestra are Schufftan Process. Only the floor space where the ballet is in progress is real



THE HALL SCENE IN "YVETTE"
DESIGNED BY ERIC ARS FOR A. CAVALCANTI

certain angle in front of the camera, so that looking through the view-finder you get a perfect picture of the model in the mirror without the reflection of the camera. Now for the action. You want Benvenuto to throw a rope over one of the battlements and climb down; so you go behind your glass and scrape away the silver right down the wall where the figure should pass, then looking through the camera again at your reflected castle you find that you have an oblong hole in the wall through which you can see into the space beyond.

Then, at a given distance behind your mirror, the distance being governed by the laws of perspective, you build a tall strip of battlement, life size, and paint and light it so as to correspond with the model in tone. The action begins; Benvenuto throws over the rope and clambers down the battlements of the castle; and the only expense has been a tall strip of wall and a small model!

"But you see the join," cries the old-fashioned art director, but you don't; and that is why the German idea is so clever; for, as they explain, all things reflected in a mirror are infinite, and therefore are in focus, whereas the jagged sawlike edge where the silver has been scraped away, because it is so near the camera, goes out of focus and disappears into the reality which is built at the correct perspective distance. This is an extraordinarily interesting process for the art director to work with.

The day when a few more architects with imagination and initiative come into the films we may expect to see some marvels of construction come to life and the films, let us hope, profit by it.

ARCHITECTURAL EDUCATION AGAIN

THE architectural schools face a difficult situation today. Within the last twelve months—it is really hardly more than that—the position of those who have supported purely traditional training in the art has become unbearable. All but a few schools have been forced to come to some terms or other with a contemporary style—or contemporary "styles"—of architecture. Those terms seem to be that contemporary design, whether as "style," or as "styles," is admitted on a par with the "styles" of the past which since the foundation of our schools have been favored for resurrection. This is quite a logical position for the schools to take, however unhealthy it may be for the development of a new generation of truly contemporary architects.

It is argued that architects depend, much more than painters or composers or poets, on patronage; that they must be ready like the inspirates of Hollywood to provide what the public (supposedly) wants. The schools are vocational schools, or at least professional schools. They must provide the public with men trained to attend to their architectural wants, as law schools train lawyers. It would, it is certainly honest to argue, not be fulfilling their purpose if today in America they turned out architects incapable of producing Georgian houses and Gothic churches and Paris-Exposition-of-1925 shop fronts, since these are all still so definitely in demand.

Architects leaving the schools must usually pass some years of apprenticeship in large offices before they set up for themselves, and the field would be very limited for them if they were trained purely in contemporary design—or indeed purely in contemporary construction—with no knowledge of wood and traditional masonry methods. I think one may still remain a radical idealist, a fire-eating modernist, and a rabid anti-traditionalist, and yet accept the above argument. But one can have little optimism respecting the possibilities of the contemporary style, and less intuitive understanding of it, if it is true that contemporary training in design, thus given on a par with training in reminiscent design, is likely to be either very sound or very profitable. Modern architecture cannot be served by syncretist acceptance. Either it is a new way of light which demands conversion, or it is merely an impediment in the growth of taste in revivalism. This is indeed an *impasse* not restricted to this country and the situation is as precarious in the *Ecolé des Beaux-Arts* in Paris as in the most advanced architectural schools here.

There is one method that one finds extensively employed by young men desirous of becoming modern architects in Europe. A significant return to the full apprenticeship system is going on—so significant that if one wishes to know what way the student generation is turning it is necessary to seek out its members in the offices of the great contemporary architects. Apprenticeship has its advantages and, of course, it has never entirely been given up in architectural education. But with the complexities of modern construction, the scale of American architectural offices, and the increasing importance of design in the most fundamental sense, it has serious faults. Apprenticeship is best adapted to the study of a craft-art, and modern architecture for better or worse can clearly no longer hope to be, except in very exceptional instances, a craft-art.

In Europe there are also new architectural schools founded since the newest architecture developed. Two of these are of great importance, that of the *Bauhaus* at Dessau founded by Walter Gropius, and that of the *Institut Superieur des Arts Decoratifs* at Brussels of which Henry Van de Velde is the head. In these schools, and doubtless in others as well, the young man or woman who has decided to become not simply an architect but a contemporary architect, can receive a complete course of instruction into which the hypothesis of imitation of the past never once enters. City planning and the functional study of industrial architecture receive special emphasis, and design is based absolutely on contemporary means of production. At the same time, as is seldom the case in America, the students are brought definitely into connection, by subsidiary or volitional courses, with contemporary painting, sculpture, theatre arts, publicity, music, and literature. They are also in direct association—like the students at the American Academy in Rome, but to how different a purpose!—with students in the other arts, and thus achieve some of that centrality of position which architects have many times needed in the past. That this sort of school will develop, is perhaps already developing, a new academicism, I do not deny. Any institution will develop academicism, and one need not be an anarchist to remark that against any sort of training the hopeful student must needs develop some degree of revolt. Yet there are *anima naturalifer academica*, and for them at the moment it is surely healthier that their academicism should be of the present than of the past.

Since the established architectural schools in America, for reasons already outlined, can hardly become whole-heartedly modern, even leaving aside the question of inertia and the conservatism of trustees, it would appear that we needed in America, for the increasing number of young men desirous of becoming modern architects, new architectural schools along the lines of those in Dessau and Brussels. If such be not provided we may expect to lose to Europe in this generation as many of our best students as we lost a generation ago, when the popularity of the *Ecolé des Beaux-Arts* was at its height.

Neutra is teaching in Los Angeles, Lönberg-Holm was for a time at the University of Michigan, Oud is to be at Princeton this Spring: there is no longer any question that instruction by the most advanced architects is welcomed in educational institutions. And yet I do not know, unless it be at Los Angeles, of a single thoroughgoing modern architectural school in the country. Needless to say, I should be only too delighted to be contradicted, for I write without research. Even if such exist, however, we shall need many more than we have, at least for a decade or so until the time comes when all architectural schools in the country may with safety and propriety be remodelled in their likeness.

HENRY-RUSSELL HITCHCOCK, JR.

SOME A, B, C'S OF THEATRE ARCHITECTURE

BY LEE SIMONSON

Although New York has more theatres per capita than any other theatrical capital, probably not a single one is of any importance as an architectural design. With a few possible exceptions the same holds true of theatres throughout the country. Fifty-five theatres were built in New York between 1905 and 1925 and until the movies began to take them over seventy-five were devoted to so-called legitimate theatrical productions. They represented a succession of gaudily ornate auditoriums and stages inadequately equipped for shifting scenery or lighting a play.

American architects have on the whole contributed nothing to the development of the modern playhouse. Compared to the Künstler Theatre at Munich (1908), the Volksbuhne in Berlin (1914), the National Theatre in Prague, and the State Theatre of Stuttgart, not to mention a half dozen more provincial playhouses, the best work in America is negligible.

Be it said at the outset that American architects are not to blame. Until very recently any architect interested in a theatre design in this country had no clients who were in the least interested in building better theatres. In Europe playhouses are as important in the eyes of a community as Mecca and Masonic Temples are to us. In European capitals, theatres have been considered civic monuments as public libraries are here, and before the war every city of importance aspired to have one on an imposing site. But almost all our theatres have, until recently, been built for real estate speculators or theatrical landlords whose one interest has been to sell the site value of the plot for as high an annual rental as could be exacted, giving as little in return as possible.

Theatre architecture has been debased because it has been in the service of the organized speculation on which the theatre business is founded in this country. No consideration of the problem of theatre building can ignore this organized speculation which dignifies itself as the 'show business.' A production with a single small set, a small crew of stage hands to operate it, and not too large a cast in modern clothes (some of which the actors furnish), can often be staged even with rehearsals for no more than twelve thousand dollars. More elaborate productions, with changes of sets and period costumes, rarely cost more than thirty-five thousand dollars. (These figures are for 'dramatic productions.' Musical comedy costs are higher but they are compensated by a higher scale at the box office and a greater weekly intake if successful.) Anyone who can lay his hands on twenty to thirty thousand dollars of capital can stage a play and in addition to our so-called 'regular managers' people with almost no experience do so. The incentive is the fabulous profit to be made if a play proves to be a 'hit' or a 'smash hit.'

Journey's End in it first year's run in New York of 401 performances did a box office gross of $819,873.48; 222 performances in Chicago grossed $348,367.65. The total box office intake of the play, including three road companies, for the United States, was $1,727,157.68 during the first year. In England the receipts of the London company and three road companies in approximately fourteen months was $920,000. The world's receipts since this play's premiere, January 21, 1929, have been $1,997,157.68. Add to this another year's run in theatres all over the world and world talkie rights as well, and the ultimate gross intake of this single play within three years of its opening may very well amount to between four and five million dollars.

A success of this sort out of the hundreds of annual theatrical productions is of course a hundred-to-one chance. But it is just that hundred-to-one chance to which the entire business of theatrical production is geared. It is the secret hope of everyone to find a *Journey's End*, a *Lightning*, or an *Abie's Irish Rose*, which will amass a fortune just as *Ben Hur*, *Monte Christo*, and *The Old Homestead*, did in a previous generation.

The theatre owner and theatre landlord have a stake in these profits. Theatres are hired on the business basis of giving forty per cent of the gross box office receipts to the theatre owner. If the theatre's share falls below five or six thousand dollars a week, a provision that is usual in every contract requires the tenant to vacate, and a new attraction is "booked." But on even less phenomenal successes than *Journey's End*, on which the average of the forty weeks of a theatrical season may easily be $14,000 a week, the theatre owner, even if his theatre is vacant for June, July, and August, may take in nearly a quarter of a million dollars.

The average theatre, seating from a thousand to twelve hundred people, can usually be built at a cost of from $600,000 to $1,000,000, depending upon its site value. What other form of real estate offers the opportunity of a gross return in any one year of twenty-five to nearly fifty per cent of the capital invested?

The theatre owner and producer moreover are often one and the same person. A producer who is also a theatre owner and controls a few theatres either outright or on yearly lease can, even in a

season when his own productions are failures, make a handsome profit by letting or sub-letting his theatres to the successful productions of his rivals.

For this reason a theatrical center in New York roughly a mile long and half a mile wide has been jammed with theatres often six or more to a single cross-street. The owner's policy is to crowd as many seats with as narrow aisles as the fire law will permit, into a 100 x 100 plot, reduce lobby space to a minimum, and give the stage the smallest proportion of the plot possible. Not only is the stage cramped to the utmost but it is equipped with a minimum of rigging necessary to make speedy scene shifts. Many stages in New York are so shallow that a play with four or five settings cannot use them. The switchboard provided by the theatre is often only large enough to control the lighting of the auditorium. Every play must bring in its own lighting equipment, dimmers, and lamps, together with every foot of cable needed. So definitely are most theatres planned for tenants that many do not provide even a single office for the management. But an extra thousand or two for rehearsals, an extra thousand or two to light a production adequately—what do they amount to when one is playing for the stake of half a million a year? Anything will do as long as one can get an auditorium with a prospect of selling it out, for such is the magic of a 'smash hit' that the public will fight to get in, crawl over each other's knees, endure a subway crush at the entrance and during the intermissions, and accept seats so spread to one side or the other that a third of the stage is invisible.

II.

What architectural progress could be expected under such conditions? Such theatre architecture as we have had reflects this economic heyday of the show business which continued until four or five years ago. But that heyday is over.

The increasing costs of railroading, of salaries, and of union labor, and again the ubiquitous movies and talkies outside of the big cities, have so depleted road profits that a road tour even of a substantial success is now the exception rather than the rule. For the first time in a decade theatres in New York have stood empty months at a time. Very few if any will again be built by the old-time real estate speculator and none, it is safe to say, will be built upon the road. The 'big money' is going into movie palaces where the great speculative returns can be earned in the future.

But theatre architecture is likely to emerge much the better for this depression which lately has approached the proportions of a panic, for, out of the shambles of the 'show business,' a new type of management has begun to emerge. These managements are not speculators raking together enough capital in order to make half a million dollars a year at one throw. They undertake theatrical production on a more coherent and continental basis. They are content with profits far more modest. They produce on a year-round program with a permanent company of actors, and by sustaining a standard both of material and production rely on the good will of a permanent audience that returns regularly for successive bills, like the *abonnés* of theatres abroad. They need a technically efficient plant and a well-equipped stage, for they realize that bad planning and clumsy mechanics, as in any other form of production, are paid for by needlessly increased overhead expense.

The Neighborhood Playhouse, the Cleveland Playhouse, the Civic Repertory Theatre, and the Theatre Guild, among others, are typical of these newer types of producing organizations. When their endowment or their earnings enable them to erect a theatre the problem they present to the architect is not, "How little can we get away with or how much can we charge the other fellow," but, "What is the best type of theatre to build in order to produce plays well?"

III.

A certain number of American architects will do well to familiarize themselves with the problem, for the bulk of tomorrow's theatres will be built not only for this newer type of professional producer but for amateurs as well.

As a result of Professor Baker's epoch-making experiments at Harvard twenty-five years ago, courses in playwriting and play production are becoming a recognized part of every university curriculum. A well equipped theatre, as at Yale, will presently be as much a part of every university campus as chemical laboratories or lecture halls are today. From the universities the demand has seeped into the high schools and from there into the grammar grades. Instruction in the art of the theatre is becoming general. Even high school auditoriums begin to be scaled and equipped today not only for commencement exercises and the morning assembly but for regular theatrical performances as well.*

Community playhouses with amateurs increasingly proficient provide a substitute for the defunct local stock company and for the dwindling number of Broadway productions on tour; and civic centers include stages ample to house not only their own efforts but to lure professionals from nearby cities. It is typical that the Westchester Community Centre just before its completion was remodeled to include a well equipped small stage for the amateur group and a large one adequate to house visiting companies.

* For the astonishing growth of community, university, and smaller theatres, see Kenneth Macgowan's "Footlights Across America," Harcourt Brace, 1929.

These are the theatre architect's new clients who make it imperative for him to face a few essentials of theatre design. I shall attempt to outline them in a preliminary way for professional stages, ignoring the modifications that may be involved in designing for college theatres, community theatres, amateur groups or high schools.

IV.

SIZE OF THE STAGE

A theatre is not only an auditorium where people sit and see a play but a stage where plays are produced. It involves the very necessary space where the work of putting on a play has to be done. Unless there is to be a shameful waste of time and labor, the stage cannot be constricted below a certain minimum of space. To perform a play there must be enough mechanical equipment to shift settings speedily, and to light them effectively once they are set.

In this connection it is essential to realize that the stage opening seen from the auditorium, in proportion to the total size of the stage or stage-house, is no more than that of a shutter at the bottom of a long chute. (See diagram) And for this

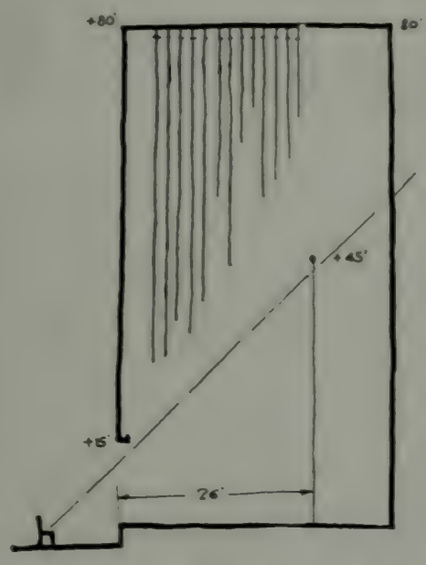


DIAGRAM OF A STAGE HOUSE

Showing dimensions necessary for good working room. "The opening seen from the auditorium is no more than a shutter at the bottom of a long chute." See text above and below.

reason: the stage is not only a space where a setting may be seen but a space where the other settings not in use must be stored while the particular one is being played in. Because the audience looks up into a stage, settings not in use must be hauled up out of sight. When the curtain is up approximately fifteen feet, a background set twenty-six feet back must be forty to forty-five feet high if a spectator is not to look over the top of it. For that reason the stage-house should be a minimum of sixty-five feet high, and where possible eighty and eighty-five feet, particularly if scenes are occasionally to be played to a depth of thirty feet or more.

Due to the cost of sending up brick or concrete walls to this height, this is usually the first item sacrificed in order to cut down the total budget. But any compromise here is invariably fatal because it involves added labor in running a show, cramps freedom of design, destroys the beauty of innumerable stage pictures, blocks the proper planning and use of lighting equipment, and slows up scene shifts.

Settings must be broken in pieces to be handled, then lowered or hauled on stage, and lashed together. Smaller sections are rolled or carried off to one side when a scene is shifted (struck), large sections hauled up out of sight. Each piece of scenery is attached to a metal pipe (batten) from which the lines run over pulleys (shives) to a slotted flooring (gridiron) at the top of the stage-house. (Page 477.) These lines are then carried down to the stage floor, tied off to a pinrail, and balanced by counterweights that can be adjusted to the weight of any particular piece of scenery, thus reducing the deadweight to be hauled. Sets of lines are usually placed six inches apart so that any piece of scenery can be hung over the position on the stage where it has to be set, and the number of such sets of lines should run from a minimum of fifty to a maximum of seventy or eighty, depending on the depth of the stage. Fortunately the gridiron, with its lines, battens, pinrail, and counterweights, has been standardized and can be easily installed provided the architect has taken the precaution to provide at least sixty-five feet at the gridiron level and keeps one side of the stage wall free for the pinrail, unbroken if possible by doors and entrances.

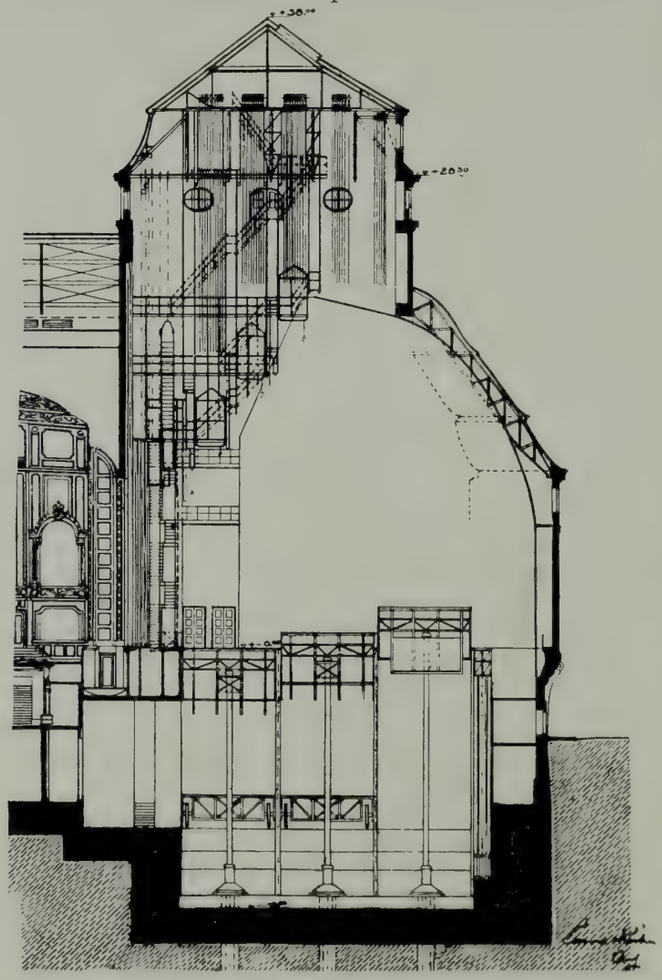
The above is by no means the ideal system of shifting scenery. It is preferable to keep most of the setting intact instead of breaking it into pieces with every shift and to move it by moving the stage itself. This is done in Europe by three systems, all electrically or hydraulically driven.

These are, (1) *a revolving stage* or turntable which comprises most of the stage floor; (2) *sliding stages*, large enough to hold an entire setting, the shifting being done by shunting one set offstage or backstage and sending another on; (3) *elevator stages*, the stage being divided into three platforms usually, running its entire width, so that even the most elaborate settings can be speedily dropped to the cellar and others sent up to replace them.

Unfortunately these labor-saving mechanical aids will probably never be within the reach of the American theatre, for in this field as elsewhere the hope that our machine age can solve any building problem by reducing building costs remains a myth. The initial cost of installing any one of the above systems is prohibitively high. In 1925 when I inquired into the possibility of such a system for the

new Guild Theatre a single section of elevator stage 12 by 40 feet was conservatively estimated at $25,000. To equip the working section of the stage would have involved an expenditure of $75,000. A theatre heavily enough endowed to afford this initial expense will be so rare that we shall probably continue to rely on a manual system of hauling deadweight, slightly aided by counterweights.

Flexibility of the stage floor however must be provided for. The business of a play or the effective design of a set often requires descents to lower levels from terraces, cliffs, or the like. Therefore, the stage floor should be arranged in easily removable sections (traps) on adjustable beams so that any portion of it can be taken out speedily and replaced in the course of a play. Most stages built during the last generation had a single trap downstage center known as the Hamlet trap, which was most often used for the burial of Ophelia by local or visiting stock companies; but a single trap is almost worse than none. The direction of a play or the design of a setting are immensely handicapped unless a stage can be trapped anywhere and to any extent.



DAS NEUE SCHAUSPIELHAUS, DRESDEN, 1913

LOSSOW AND KUEHNE, ARCHITECTS

This theatre has several excellent features: the stage is about 80 feet deep; the stage house is over 100 feet high to the grid; there is a permanent sky-dome; three elevator stages extending from side to side permit rapid and easy shifting of scenery. From the American standpoint, this is a Utopia

THE PROSCENIUM FRAME

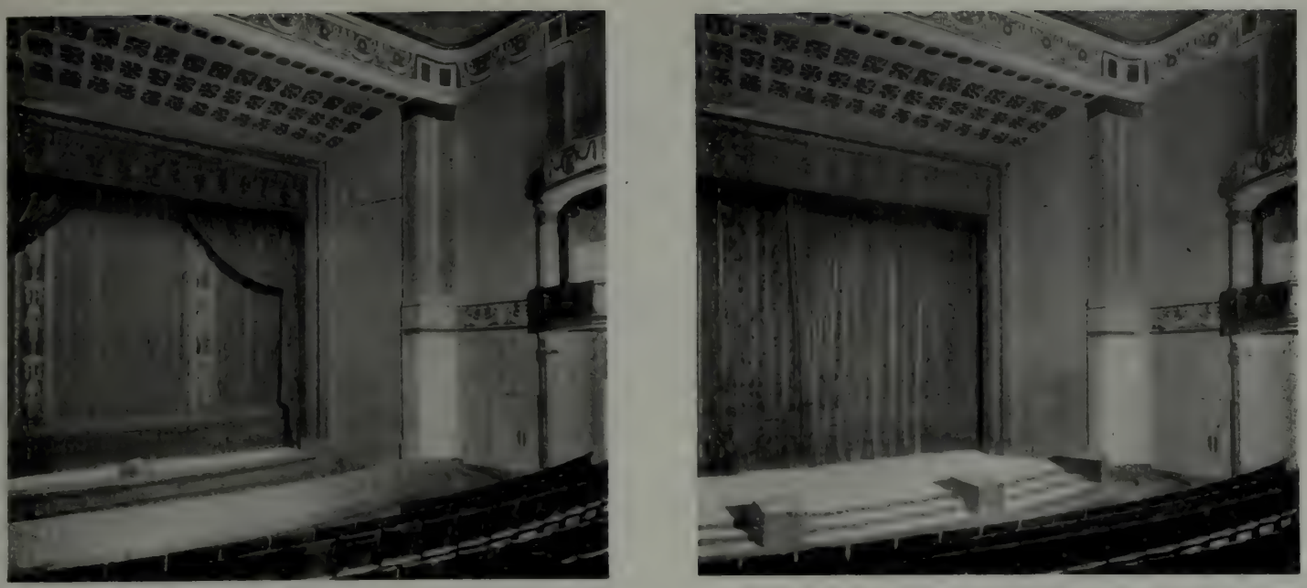
Due to the eclecticism of modern repertory, the revival of classics, Greek or Elizabethan, and the frequent experiments in formal stage, i.e. non-realistic stages in which actors move beyond the proscenium arch or descend to the audience or make entrances from the auditorium, the less the proscenium frame is emphasized by ornament the better. It should be an unemphatic frame, made flexible in size by adjustable draperies or more rigid frames, i.e., inner prosceniums, which should be carefully studied both as part of the auditorium design and in relation to the working of the stage.

A fore-stage is often essential, but it should not be permanent, since it handicaps a more realistic production in which the actors are confined within the limits of a setting behind the proscenium. An elevator platform that can sink to become part of the auditorium floor when not used or below that level to hold an orchestra, is particularly valuable. But with less expense it can be built in removable sections. Portals in a proscenium or in a proscenium frame should be provided and made part of the auditorium design.

THE DEPTH AND WIDTH OF THE STAGE

Though no absolute can be established, I have found in ten years' practice that a thirty to thirty-two foot width is ample for almost every type of production, even the most spectacular, except where chorus girls need to be strung forty feet or more back of the footlights. Moreover fully half the plays given require interior settings. Actors using an imitation of colloquial speech become ineffective when more than fifteen or sixteen feet behind the footlights and a wider opening than thrity-two feet makes for ineffective design because it forces rooms to be more than twice as wide as they are deep. However, the thirty-foot width is best set by an inner proscenium, leaving the permanent opening five to ten feet wider for an occasional pageant or large scale spectacle.

But the width of the stage-house like its height is essential not only for the setting that is in view but for the stacking of settings that are to follow it. Except for low gridiron, insufficient stacking space is the greatest handicap that a production can encounter. The ideal practice is to leave at each side of the proscenium a space of thirty feet to the side walls, a total width exclusive of outside alleys or hallways to dressing-rooms of ninety to one hundred feet of unbroken floor space unencumbered by projections of any kind —except for the two stairways to the cellar, preferably in the up-



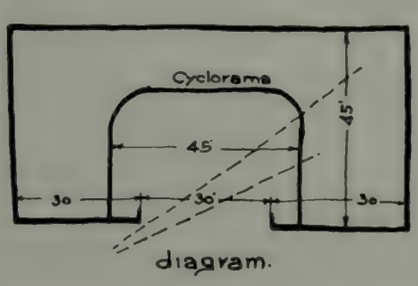
THE VARIABLE PROSCENIUM, DAS GROSSHERZOGLICHE THEATER, WEIMAR, 1908

At the left it is shown with the stage in its usual position; at the right with the stage built forward for a Wortdrama or spoken piece.

stage corners, which are essential for actors to make crossovers during a performance.

The depth of a stage with a thirty foot wide proscenium opening can be safely set at forty feet, though fifty feet is preferable. Of this the rear ten to fifteen feet will be available for stocking space which is particularly valuable when repertory changes from week to week require that several productions be kept available.

Of the forty to fifty feet the playing limits of the stage can be set at a depth of thirty to thirty-five feet, marked by an essential piece of permanent equipment, the cyclorama.



There must be room at the sides. (See text above and below)

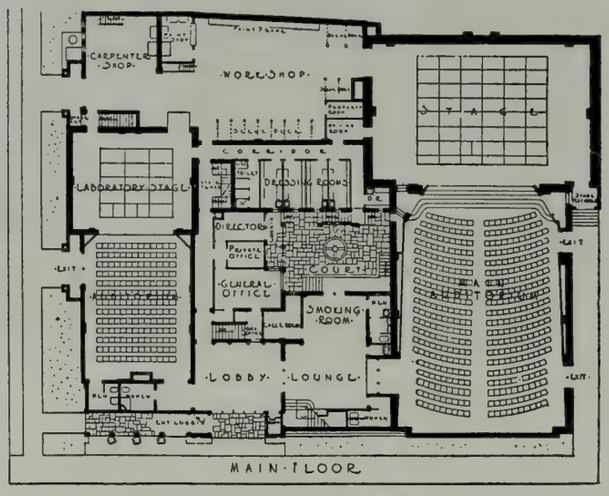
A glance at the sight lines will show that for open-air scenes it is essential to hide side walls and simulate the orb of heaven. This is accomplished by approximating a cylinder of canvas placed forty-five to sixty feet high so that spectators in the front row cannot see over its top, and brought downstage far enough so that those in the side seats cannot look through to the side walls. The canvas cyclorama is the bane of every stage, because none has ever been known to hang flat. The folds destroy every beauty and illusion of atmospheric space which modern lighting can give.

German technicians have perfected cycloramas which are motor-driven on upright rollers, can be spanned in less than a minute, and run in an overhead track, which prevents the huge expanse of canvas from bellying and wrinkling. No one in this country seems capable of reproducing this apparatus. The best substitute available is a cyclorama of canvas mounted on profile (three-ply) board supported by a rigid skeleton frame of wood—a costly and extremely heavy item of equipment because it must be especially counterweighted and electrically hoisted so that settings can be passed under it for scene shifts. (The hoisting of a cyclorama is merely another reason why a high gridiron of eighty to eighty-five feet is always preferable and a low one always causes trouble.) But the added cost of this installation is worth fighting for, since it is only on such a rigid surface that a diffusion of light can be attained, which is so vital an esthetic element in imaginative stage pictures which are part of imaginative stage production.

OTHER STAGE PROBLEMS

In addition to the stage proper, the theatre architect has other problems to solve in his general stage plan, such as the workshop for the stage carpenter, usually in the cellar, where scenery can be repaired or altered; a similar workshop for the

electrician where he can assemble his equipment and store his reserve of lamps, gelatin, cables, and so forth; and another where the property department can make or repair the furniture which the actors handle, and also store between performances properties too valuable to be left on an open stage.



Plan of the Cleveland Play House, showing the extensive off-stage facilities especially necessary to the community theatre that must make most of its own scenes and properties. Philip Lindsley Small and Charles Bacon Rowley, Architects

In a university or community theatre which is too remote from a metropolis to order its scenery from scene contractors and scene painters, and which therefore must plan to build and paint most of its productions with its own staff, these workshops may have to be large enough to become wings to the stage-house proper. They should be considered as an integral part of the theatre plant from the outset. Their efficient layout is as important for a modern theatre as the layout of an operating-room for a hospital, or kitchen and pantries for a hotel.

Storage space, where frequent changes of bills are part of the theatre's program and settings for three or more plays have to be kept available, may involve another addition to the stage-house. This storage space should be made directly accessible to the stage, with a fireproof door large enough so that settings do not have to be dismantled during the few days they may not be in use. A scenic storehouse can be made an integral and valuable element in design, as witness the twin theatres in Dresden where the storehouse forms a connecting link between the large and small theatres and ties them into one architectural unit.

PROVISIONS FOR THE ACTOR

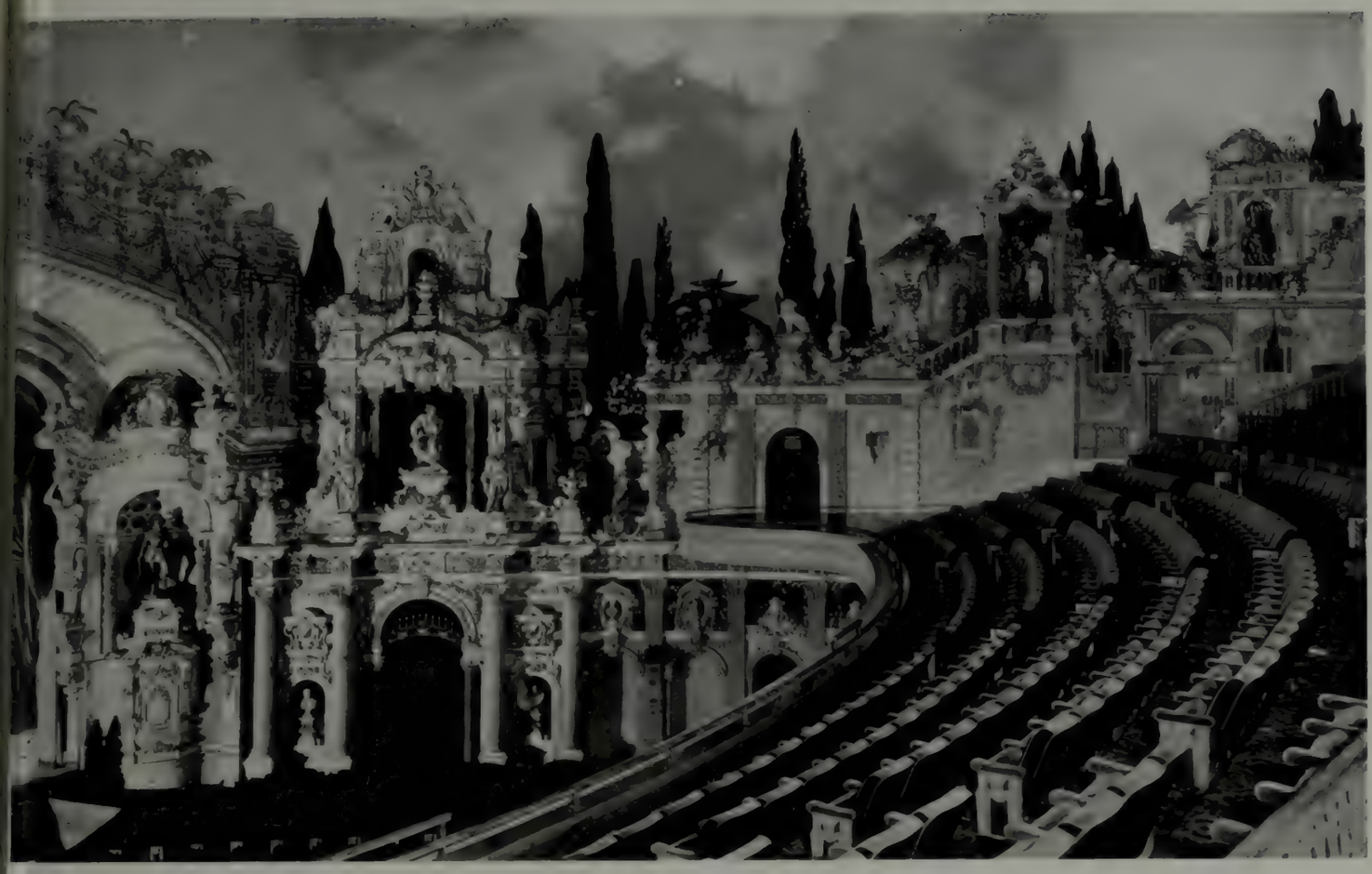
As the casts of many plays run to fifteen and twenty speaking parts, and often more, dressing-room space must be adequate, for no plan of producing only plays with small casts can ever be adhered to. Tradition in the theatre gives the leading players star dressing rooms, limited to one actor apiece. Two of these rooms are usually sufficient. The less important actors can be grouped two, three, and four, in a room. The arrangements for lighting these rooms in order to assist the process of "making up," for providing dressing tables, hanging space for changes or wardrobe, etc., have also been standardized and can be procured as readily as the better makes of plumbing. However, in providing dressing room space several needs are usually overlooked.

1. Two very large rooms where mobs or "extras" often counting up to fifteen or twenty can dress. Failure to provide these means that they have to "make up" underneath the stage, a thoroughly unsatisfactory practice and one forbidden by the fire laws in most communities. 2. Showerbaths should be provided on every dressing room floor as an actor, in "Caesar and Cleopatra" for example, may often have to make up not only his face but his entire body.

The placing of the block of dressing rooms is usually solved by cutting off fifteen or twenty feet of the total width of the lot—which should be kept free for the stage proper. Considerable thought should therefore be given in any theatre plan to providing adequate dressing rooms without cutting down the maximum stage width and at the same time without running the dressing room block up so many stories that quick changes of costume which often have to take place during the course of an act, are not handicapped.

SPACE FOR THE MANAGEMENT

The old-time management usually consisted of the theatre manager himself, a treasurer, and a press agent, who might if necessary be huddled into a single office. But the newer managements undertaking a year-round production plan invariably require larger permanent staffs. Planning for them will require particular study, varying with the organization of any particular group, but providing adequate space for the business or subscription department, press agents, play readers, drafting rooms for the technical staff, and, in connection with university theatres, studios, classrooms, and workshops for instruction in theatrical design. In any organization a rehearsal room should be placed somewhere in the building because two productions may often be in rehearsal at the same time. Particular care should be given to the acoustics of this room. The stage space should correspond to the working area of the main stage: roughly thirty by twenty feet. It is advisable but not necessary for it to be raised above the level of the floor.



AUDITORIUM OF LOEW'S PARADISE THEATRE, NEW YORK CITY

JOHN EBERSON, ARCHITECT

It is the large moving picture and vaudeville house that now draws the speculative profits; being built for the crowds, it must be sumptuous. The drama meanwhile is going into the hands of steady and moderate year-round producers of a new type

THE AUDITORIUM

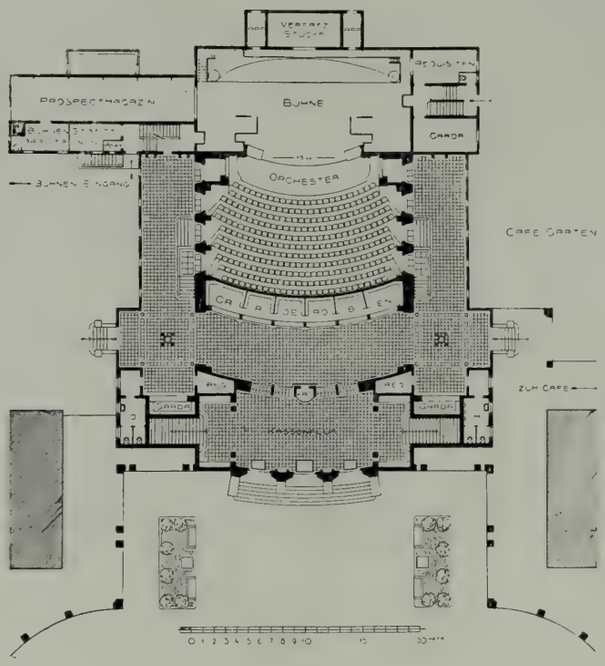
In designing the auditorium the chief benefit to be derived from having as a client the newer types of theatrical organization is the fact that they will have no money to waste on over-elaborate decoration or gilded gingerbread, and no desire to impress their audiences by such means. As they are interested in running the theatre upon a sound production basis, the maximum instead of the minimum of their available capital will go into the items of stage equipment, usually ignored by the speculative theatre builder. For that reason auditoriums will be far simpler in design and materials, and all the better for it.

The possibilities here are too many to be discussed within the limits of this article. Nevertheless, one essential feature of planning the auditorium should be reconsidered, namely, that the American system of narrow rows and two or three aisles is neither comfortable nor efficient. A balcony cuts down some of the sight lines of the rear rows of the auditorium underneath it and the rear seats of the balcony almost invariably give an unsatisfactory view of the stage.

The German system, used in many theatres, of building the entire auditorium on an amphitheatre plan, is in every way preferable, particularly where the demand for the number of seats to be sold is not so great as to make it unpractical. In this plan even the rear seats have an excellent view of the stage. Every spectator sees well over every other spectator's head. Every row is an aisle, with two exit doors immediately to right and left for every 2 or 3 rows of seats. The arrangement not only makes for comfort and better sight lines during the performance but in the emergency of a fire will empty the theatre in far less time than our present arrangement.

All current seating methods also tend to get the required number of seats into an auditorium by spreading them out in too wide a fan shape, thus

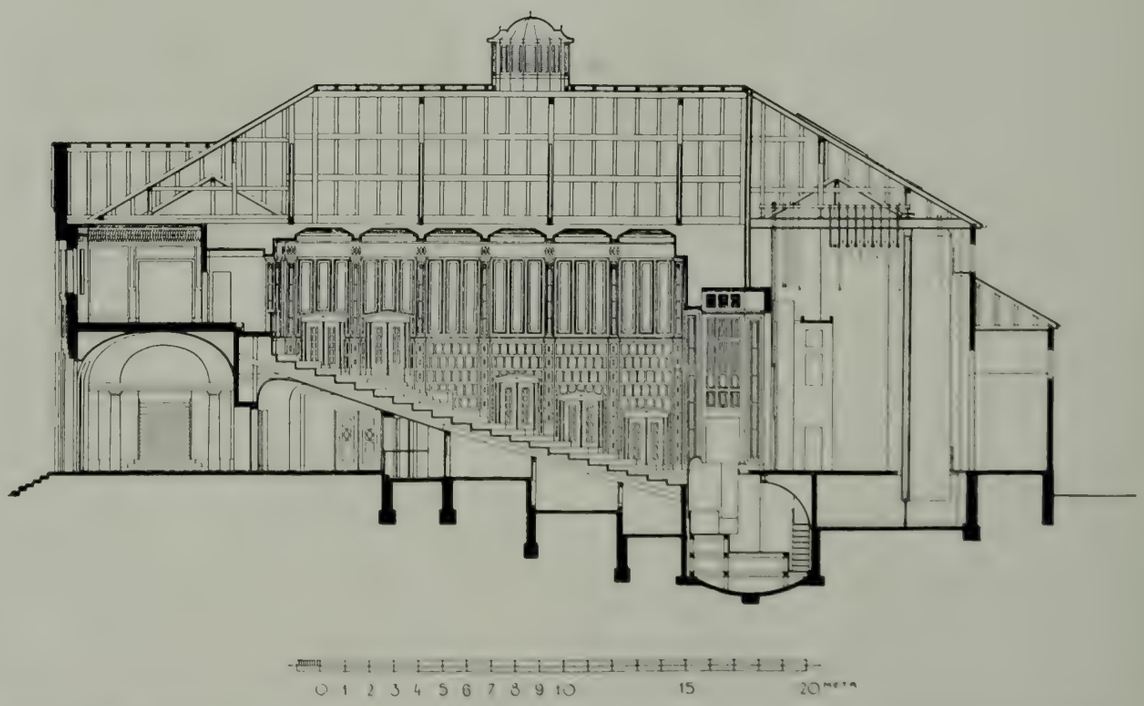
giving nearly one-third of the house extremely bad sight lines to the stage. The ideal solution is that at the Munich Künstler and Prinzregenten theatres where the seats extend a very few feet beyond the limit of the stage opening. The further advantage of the amphitheatre plan is that it lifts the rear of the auditorium high enough so that the space beneath the rear portion can be effectively used for promenades, smoking-rooms, and so forth. (See cross-section of the Künstler Theatre).



PLAN AND SECTION OF THE KÜNSTLERTHEATER, MUNICH, GERMANY, 1908

MAX LITTMANN, ARCHITECT

The plan shows not only the space set aside for storage, rehearsals, and management, but also the excellent aisle-less auditorium seating plan with exits for every three rows. Distance between rows is sufficient for late-comers to pass without discommoding those already seated. Note the easy sight-lines in both planes. The slope of the floor shown in the section was adapted by the Theatre Guild to American conditions, the space beneath being used for lounges. The Künstlertheater has a very low stage house, built in accordance with special theories of the producer



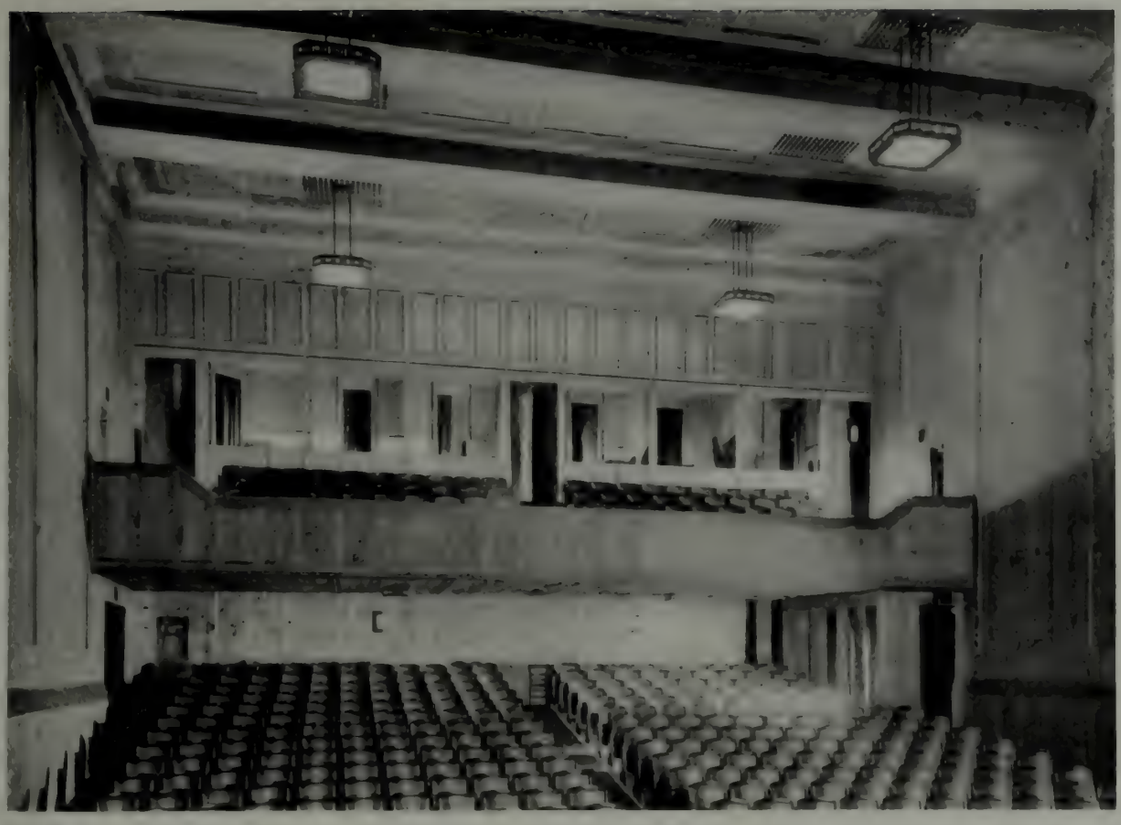


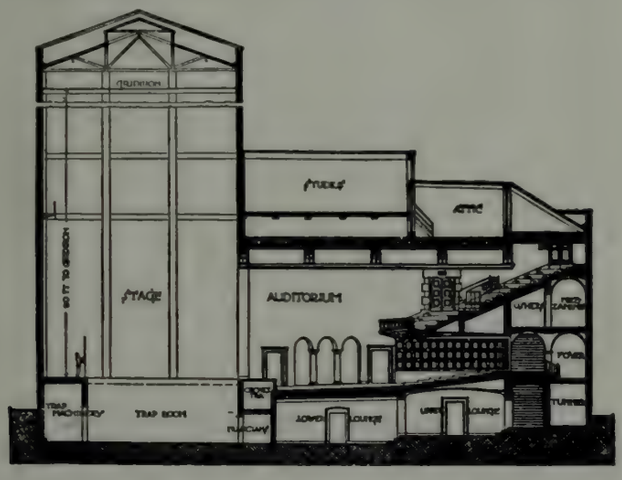
Photo Fischer

AUDITORIUM OF THE CLEVELAND PLAY HOUSE, CLEVELAND

PHILIP LINDSLEY SMALL AND CHARLES BACON ROWLEY, ARCHITECTS

LIGHTING EQUIPMENT

I have left to the last an item of stage equipment so imperative to the proper functioning of a modern theatre that it should, if possible, have been placed at the beginning. No modern production whether realistic or formal can be made effective without the greatest detail and elaboration in lighting. The mood of almost any modern production depends upon the subtle manipulation of the light.



SECTION THROUGH THE GUILD THEATRE, NEW YORK CITY

C. HOWARD CRANE AND KENNETH FRANZHEIM, ARCHITECTS

An adaptation of the section shown on the opposite page

The practice before theatrical production became a modern art was to string a certain number of lights in metal troughs across the stage, flood the stage and the actors uniformly with even radiance which could be switched into two or three colors. This was known as floodlighting, and was thoroughly undramatic in its effect. Its place has been taken by spot-lighting, that is, a large number of electric lamps of from 500- to 1500-watt capacity which can be focused independently over the stage area and lighted in turn in order to cover dramatic fluctuations of the play. These lamps will often run from fifty to one hundred for a single production used in constantly changing permutations and combinations.

In modern producing every lamp occupies the place of an instrument in a symphony orchestra. Each must be individually controlled; that is, taken up or down to any point of intensity, independent of any other. This involves a separate switch for every lamp used, a separate resistance coil or dimmer coil, and a switchboard adequate to handling a hundred lamps when necessary in innumerable shifting combinations.

The nerve center of a modern stage is therefore

the switchboard and its design is of paramount importance. However, it can be planned only in conjunction with a definite lighting system. One of the first steps that an architect must take in planning a stage is to find out how the particular organization for which he is designing plans to light its stage, and then plot the electrical equipment needed. The dimensions of a board, the place it occupies on the stage, and its relation to the lighting equipment, should be finally settled before the stage-house is built as part of the architect's original plan, and not, as is so often the case, be squeezed in after the stage-house is already in construction or cut down because space for the board required has not been forseeen and provided for. A lighting engineer should be called into conference *before*, not after, the first blueprints are made.

The technical requirements of a switchboard are too many to be detailed here. The main object to be kept in view is the compactness of the board itself so that a single electrician can control the manipulation of lights through the play which may often run to a hundred or more light changes or light cues in a single evening.

The difficulty with most standard switchboards is that the handles controlling the switches are interlocked as a separate unit from those controlling the dimmers, so that a light has to be turned on in one section of the board and controlled in another, producing great inefficiency and inflexibility in handling the lights when it does not demand a human being with four to six arms. The dimmer boards on which the switches are mounted integrally with the dimmer handles, particularly those with magnetic or remote switch controls with which many changes of lights can be pre-set—therefore making the design of the board far more compact, easily read, and easily controlled—are in every way preferable.

At the moment further progress is imminent. A system of electrical control seems on the point of being perfected such that the actual controlling mechanism on the stage will be tremendously reduced in size and controlled by handles no larger than those of radio dials, capable of pre-setting two and three light changes and controlling as well the speed of these changes from fifteen minutes to one second, with the bulky part of the equipment, the dimmers themselves and the switch contactors stored underneath the stage in the cellar.

The lighting of the stage that I have found most effective consists of lighting from both sides and overhead, the side lighting being done behind the inner proscenium by spotlights clamped to an upright metal pipe and running from twenty to twenty-four feet. Fifteen photolights can be placed on each side, angled over the playing area, reangled, and their colors changed if need be between the acts. From the bridge overhead twenty or more spotlights can be hung and similarly used.

The lighting of the sky involves a separate set of lights, worked on a three-color system in which red, blue, and green lights are mixed in order to give the range of the spectrum. The spacing and hanging of these must be considered in laying out the gridiron plan and providing special counterweights when the installation is large enough to require them. Footlights can never be relied upon to offset the occasional facial shadows cast by overhead lighting without destroying the balance of all other light on the stage when used to their full capacity. They must be supplemented and can often be replaced by spotlights thrown down on the fore-part of the stage from in front of the proscenium. The ceiling of the auditorium must be designed to conceal them.

In addition every stage needs base receptacles known as "stage pockets," which will hold a minimum of six stand lamps to throw through entrances, windows, etc. and for which the wiring conduits must be provided in planning the stage floor.

V.

This outline is no more than a bare skeleton of the theatre's requirements and necessarily ignores any number of special problems which arise in the construction of any playhouse. Our newer theatres will probably involve more than an auditorium and stage proper because they tend to be centers of university or community life. The foyers will be far more important than they are in the Broadway theatres of today where they serve simply as a space to wait for a taxicab. They will be planned on a far more ample scale as a center where permanent theatregoers can meet not only during intermissions but at lectures, and exhibitions, when performances are not being given. The theatre building will be planned not only for the stage but for its relation to the group activities of a community or university. The theatre architect will therefore have the additional incentive of meeting in his plan not the commercial greed of a real estate speculator but the keenest esthetic interests of which American communities are capable. For that reason theatre planning in America within the next decade may become not only sounder in its technical basis but more significant in architectural design as well.

PROCEDURE IN DESIGNING A THEATRE

BY ROBERT L. DAVISON

We express appreciation for the cooperation of the following:

A. D. Hill, of Hodgens and Hill, Theatre Architects, for practical suggestions on procedure in theatre planning.

S. R. McCandless, Professor of Lighting, the Department of Drama, Yale University, for valuable information on lighting and mechanical equipment.

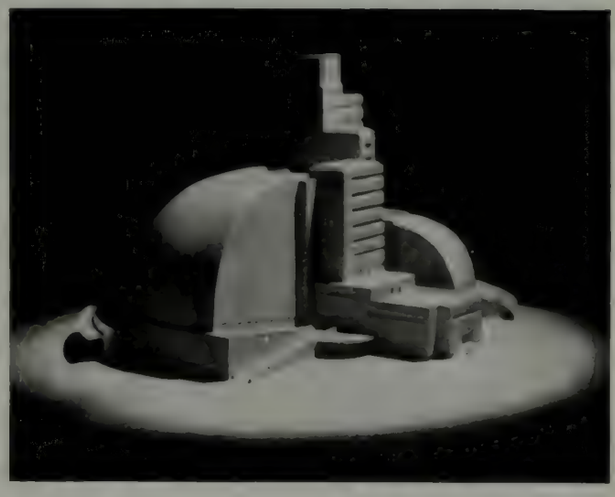
Munroe R. Pevear, of Boston, Illuminating Engineer and designer of stage lighting equipment, for advice on problems of theatre lighting.

Peter Clark, designer and manufacturer of stage rigging, for details of stage rigging and for criticism of this article from the standpoint of current commercial practice.

A. B. Randall, for the formula to determine sight lines in a theatre.

Wm. F. Wilmurt, Milton Lowenthal, and Emilio Di Rienzo, School of Architecture, Columbia University, for valuable assistance in collecting data for this article.

We also acknowledge valuable assistance from Lee Simonson on stage design, and from Kenneth Macgowan, who supplied data on the Community Theatre. There were also a number of architects who graciously lent assistance and supplied plans and photographs without which the article would have been impossible.



Above: Model by Norman Bel Geddes of a self-contained group of theatres proposed for the Chicago World's Fair of 1932

SPECIAL NOTE: The problems of acoustics and lighting in theatre auditoriums will be separately treated in another number of the ARCHITECTURAL RECORD soon.

NEXT MONTH: GASOLINE FILLING AND SERVICE STATIONS



Sketch of a proposed METROPOLITAN OPERA HOUSE for New York; JOSEPH URBAN, Architect

PROCEDURE IN DESIGNING A THEATRE

BY ROBERT L. DAVISON

I. GENERAL LAYOUT OF BUILDING

In order to illustrate a method of procedure in the preparation of plans for a more or less *standard*, *medium-sized*, *average theatre*, we will assume a plot of ground 110 feet wide and 180 feet deep. The theatre should be designed for use either as a legitimate theatre or for movies, as conditions may warrant a change from one type of production to another, but even if it were used exclusively for movies, there would still be the advisability of stage room for prologues or vaudeville acts.

Because of wide variations in local requirements no attempt has been made in this study to differentiate between motion picture houses, presentation houses, hired legitimate theatres, and what might be called the community or experimental theatres.

A. PREPARATION OF PLAN

All plan dimensions forward or backward from the stage are given in relation to the "curtain line." Dimensions to the right and left are taken from the center

line of the proscenium arch, drawn at right angles to the curtain line. Vertical dimensions are figured in their relation to the elevation of the stage floor, which is taken as zero. The plan is developed only after these three lines have been located.

1. CENTERLINE. On the ground plan draw the central line for the long axis and mark off, from the rear lot line of this axis, the following points: (asbestos) curtain line 30 feet; add 2 feet for proscenium arch and 2 feet to the edge of the apron; add 13 feet to rail dividing pit from auditorium; add 5 feet 6 inches to the back of first row of seats, and then lay off rows of seats 32 inches on center.

Allow a 10-foot court on each side of the auditorium extending from the stage to the street (the width of courts varies, from five feet upward, according to the local or State laws. The building code recommended by the National Board of Fire Underwriters specifies 10 feet for theatre with audience of 1,000 and one foot additional for each additional 500 or fraction thereof). Draw lines parallel with this court line 2 feet inside to indicate line of inner wall and columns. Take a point on the axis 20 feet in rear of the rear lot line as the center point for radius for establishing curve for seats. Using this point, draw an arc through the point established on the axis for the back of the first row of seats.

2. LOCATION OF SCREEN AND PROSCENIUM ARCH. Indicate a 42 foot wide screen, 8 feet back stage from the curtain line. Establish two points on the inside wall 50 feet in front of the curtain line. Draw lines from the end of the screen to this point. These are lateral sight lines. The proscenium opening should clear these lines. Establish the stage wall on each side of proscenium arch 6 feet forward from the curtain line. Draw in the side wall lines from the 50 foot point to the stage wall, allowing a 3-foot distance from the sight line to the point where it intersects the first row of seats. The front wall of the stage from this point will drop back to the front edge of the proscenium arch. Allow four feet from the sides of the proscenium to the sides of the orchestra pit. Draw in the orchestra pit, using radius point previously established.

3. LAYOUT OF SEATS. A bank of 13 seats, which is the number usually permitted under building codes, occupies 22 feet. (If 22″ per seat is allowed the section will occupy 23.8′.) Block in this section of seats 11 feet on side of centre axis. On each side of the centre bank at the orchestra pit, indicate a 3-foot wide aisle which shall increase approximately 1½ inches in every 5 feet toward the rear of the theatre, so that, 80 feet from the orchestra pit, the aisle will be 5 feet wide.

Next, draw in the wall aisles allowing 3 feet width at orchestra pit (minimum required by law is usually 2 feet) and 1½ inches additional for each additional 5 feet in length. Wall aisles are sometimes omitted in which case 7 seats may be placed off from the aisle. Before determining the rear standing rail it is now desirable to work from the street side.

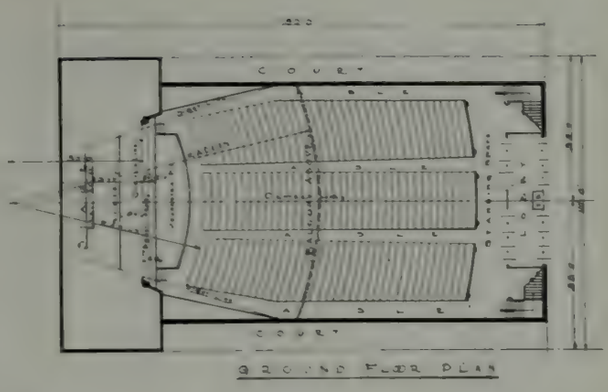
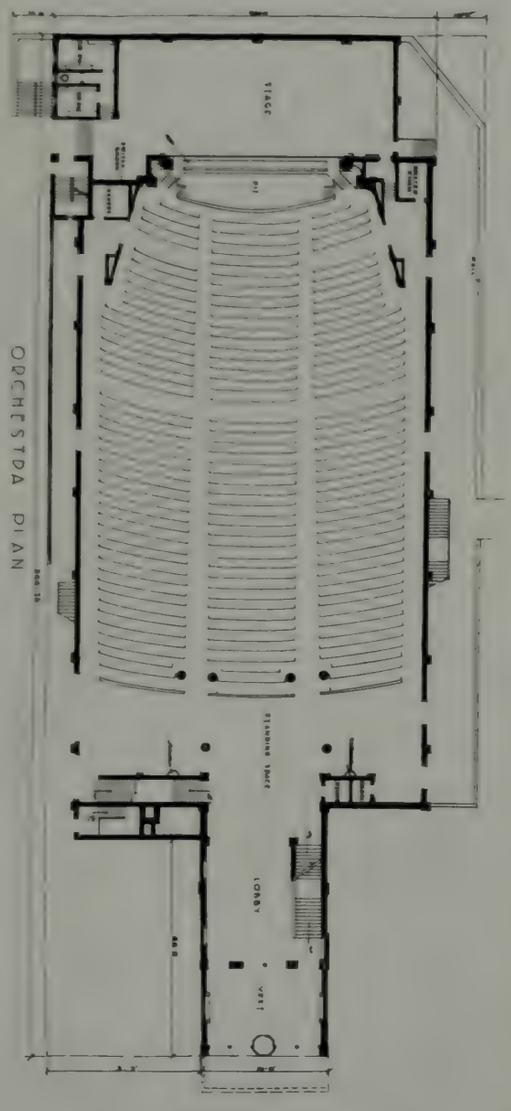
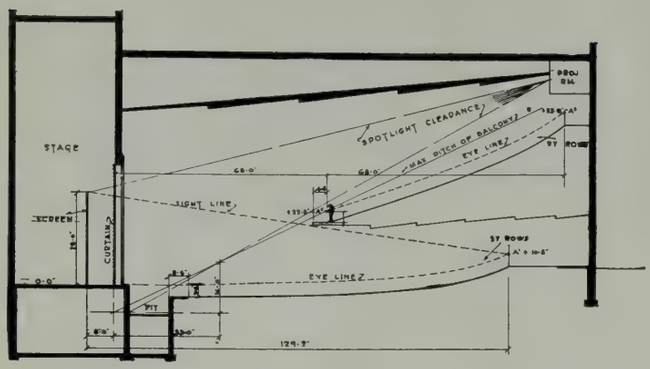


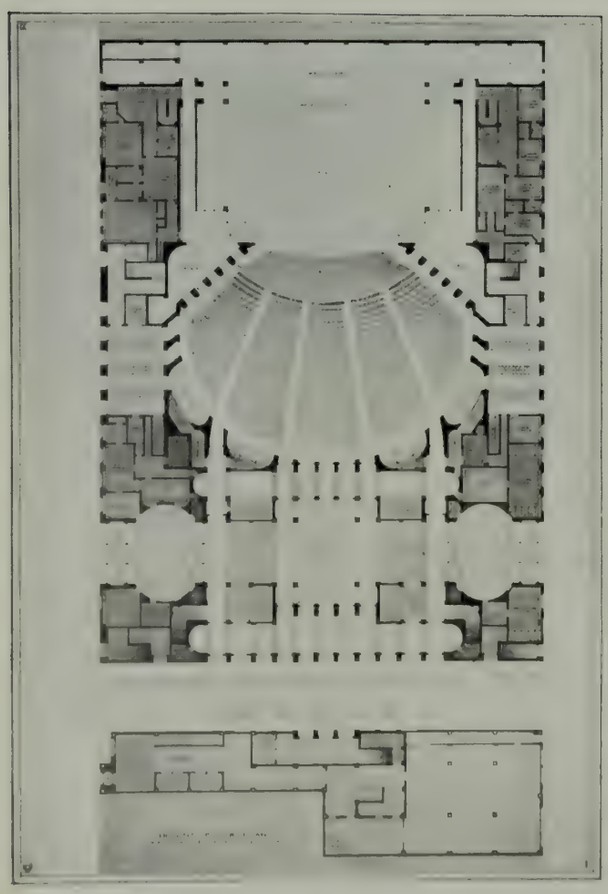
Illustration of procedure in laying out a theatre plan. See text at the left, and section on next page



Plan of a MOVING PICTURE THEATRE in Philadelphia; H. C. Hodgens and A. D. Hill, Architects. Motion picture houses require stage space for occasional presentation plays and for vaudeville acts



Section illustrating procedure in laying out a theatre plan. See text, beginning on previous page



GROUND FLOOR PLAN of a proposed METROPOLITAN OPERA HOUSE for New York City; JOSEPH URBAN, Architect

4. ENTRANCE AND STANDING ROOM REQUIREMENTS. Most building codes require 1½ square feet of entrance and standing room per seat, and many of the large theatres provide considerably more space than this. Assuming the auditorium to have 3 banks of 35 rows with 13 seats in a row, the seating capacity for the first floor will be 1,350. This number of seats multiplied by 1½ square feet = 2,025 square feet of standing room required which, divided by the width of the building (110–10–10 = 90) gives 22½ feet from street to standing rail back of last row of seats. As a certain amount of room will be occupied by ticket booth and walls, it will probably be desirable in preliminary sketch plan to allow at least 24 feet from street to last row of seats.

Locate the ticket booth (at least 4 feet x 5 feet in area) in center of entrance lobby and estimate the door space required on each side of the ticket booth. Building codes vary, but for the purpose of illustration assume that a minimum of three 5-foot doors are required for the first 500 seats and that each additional 100 seats require 20 inches more door space. Assuming that the theatre may seat two thousand people, including the balcony, the required door width would be (2000-500) $\times \frac{20''}{12''} = 25$ feet. Three 5-foot doors + 25 feet additional = 40 feet of doors to be provided. This will establish the width of lobby over the width of ticket booth. For the average theatre of this size allow a 12-foot to 16-foot deep lobby (unless it is to have stores), a second tier of doors and 12 feet standing space between inner lobby doors and standing rail in rear of last row of seats. Place any columns needed on line of standing rail.

5. LOCATION OF TOILET ROOMS. If the theatre is not to have a balcony, the ladies' and men's rooms may be located either above the entrance lobby on either side of the projection booth or in the basement.

6. BALCONY. If the theatre is to have a balcony, assume a point approximately 65 feet back from the curtain. Use the radius point previously established and rough in the seat plan of the balcony. From the front of balcony to the back of the first row of seats there should be a distance of 4 feet. In the balcony, because of the effect of the rise on leg room, the distance from row to row should be not less than 33 inches, this distance depending largely on the slope of the floor.

7. STAIRCASES AND VOMITORIES. For a building of this size, it is probably desirable to provide a 5-foot wide cross-over aisle about 10 rows back from the front which will connect with the vomitories which should come in on the wall sides so that the crowds will not stand in front of people who are seated. Vomitories should never be less than 8 feet in width.

Width of stairs from mezzanine or balcony to main floor are generally covered by local building or fire codes but generally a 4-foot wide stair is required for the first 50 seats and 6 inches more width for each additional 50 seats. Hand rails should be provided on both sides and

when the width exceeds 7 feet, there should be a hand rail in the center.

B. Longitudinal Sections Through Theatre.

a. Vision Lines. In designing a theatre it is of utmost importance to provide for good vision from every seat in the house. Most methods in use today in offices are largely a matter of experience rather than a scientific method for providing ideal sight lines. For the rule-of-thumb method see marginal note.

Using the mathematical method which follows, the architect may determine ideal sight lines and then make such sacrifices as are necessary to keep down the cost of stepping the auditorium floor.

In the following example we have compromised to the extent of providing sight clearance over heads of those in third rather than second row ahead of the eye level of row being figured.

Procedure.

To find the *level of the eye* above the stage in any given row, the following procedure* should be used:

1. Select a focal point to be seen by all spectators. (In this case the intersection of the stage and the curtain line)

2. Determine the distance from the focal point, of the eye of a person in the first row of seats, and its height above this point. See table on page 466.

(When the distance does not conform to one shown in the table, use next spanning interval below same, i. e., closer to the stage. Thus, if the eye at the first row be 22′0″ from the point selected, with 32-inch seat spacing, use 21.33′, the next lower spacing.) The height of the eye above the stage in the first row should be 4″.

3. Determine the distance (by referring to table) of the row in question from the focal point.

4. Decide on a desirable clearance from row to row.

In the accompanying example we will use a 1.33″ rise per row, i.e., the line of sight of a spectator in any row will be 1.33″ above that of the person ahead at that point. This provides for a sight line clearance of the heads of persons in the third row ahead of the spectator. This condition should be fairly satisfactory for comfortable vision in a theatre. (Two inches per row are preferable.) In stadiums where spectators wear hats, as much as 4-inch clearance per row is often desirable.

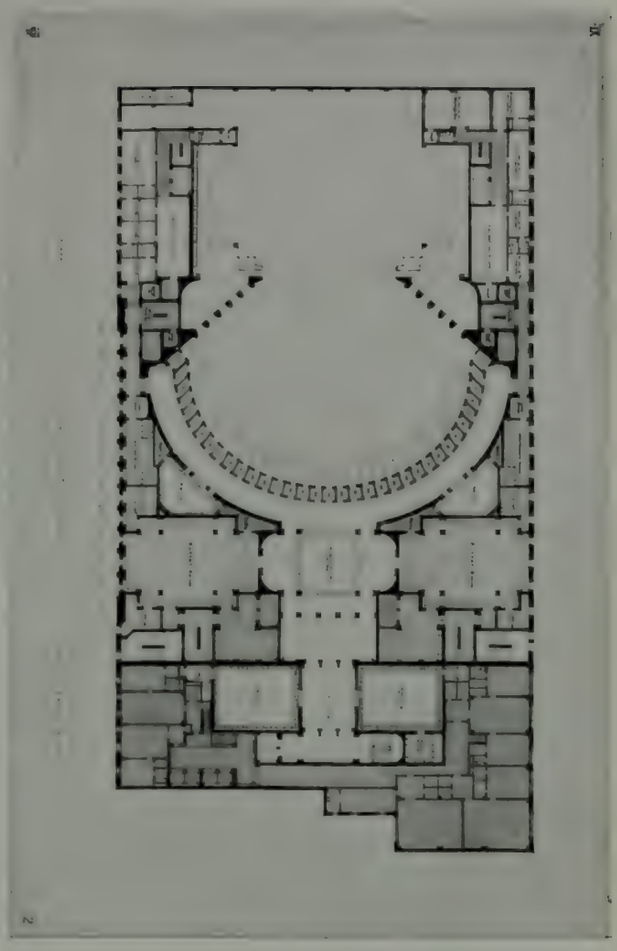
Formula. The formula for finding the eye level follows:

$$e_n = \left[\frac{e_1}{d_1} + c \left(\frac{1}{d_1} + \frac{1}{d_2} + \cdots \frac{1}{d_{(n-1)}} \right) \right] d_n$$

In which e_1 = eye height of 1st row spectators.
e_n = eye height of nth row spectator.
d_1 = distance from focal point to 1st spectator.
d_n = distance from focal point to nth row spectator.
c = rise per row (1.33″ or $^1/_9$′ in our case).

Application: Using the condition in the type of theatre

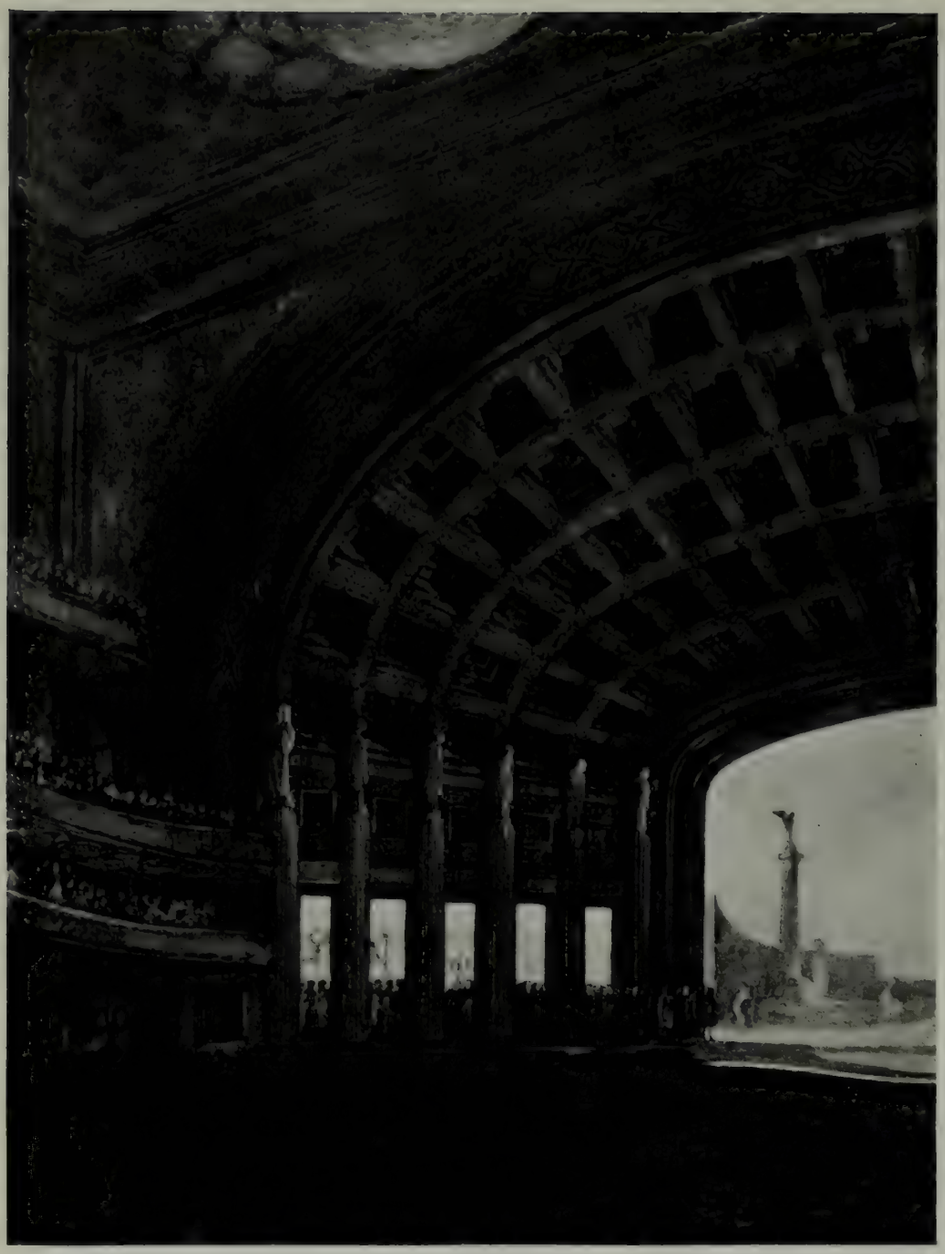
*This method of determining theatre sight lines was prepared for us by Mr. A. B. Randall. For complete discussion of mathematics and theory involved and for application to stadiums see The American Architect and Architectural Review—May 21, 1924.



Parterre boxes in a proposed metropolitan opera house for New York City; joseph urban, Architect

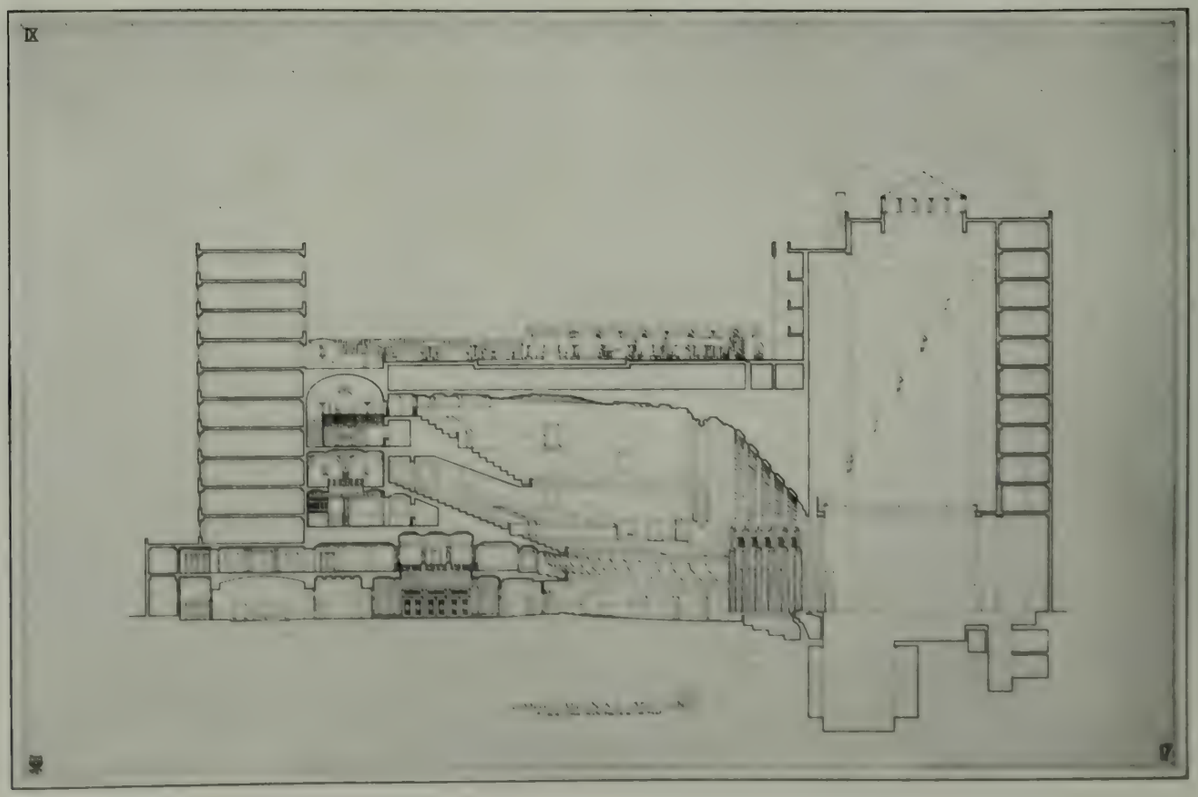
SIGHT LINES BY SHORT METHOD

The rule of thumb method for determining sight lines, not entirely accurate but which is frequently used, is as follows: the floor grade is established at approximately—3′4″. The architect lays off the floor grade using ¼″ rise per foot run for first 16 feet, then ½″ per foot rise for the next 16 feet, 1″ per foot for next 16 feet and so on doubling the rise every 16 feet. If this gives too much pitch or results in too high a grade for the rear row of seats the original rise is reduced and the processes repeated till the desired results in pitch and grade (not sight lines) are obtained



Proposed Scheme for METROPOLITAN OPERA HOUSE, New York City; JOSEPH URBAN, Architect.

Proscenium shaped like human mouth for acoustical reasons.



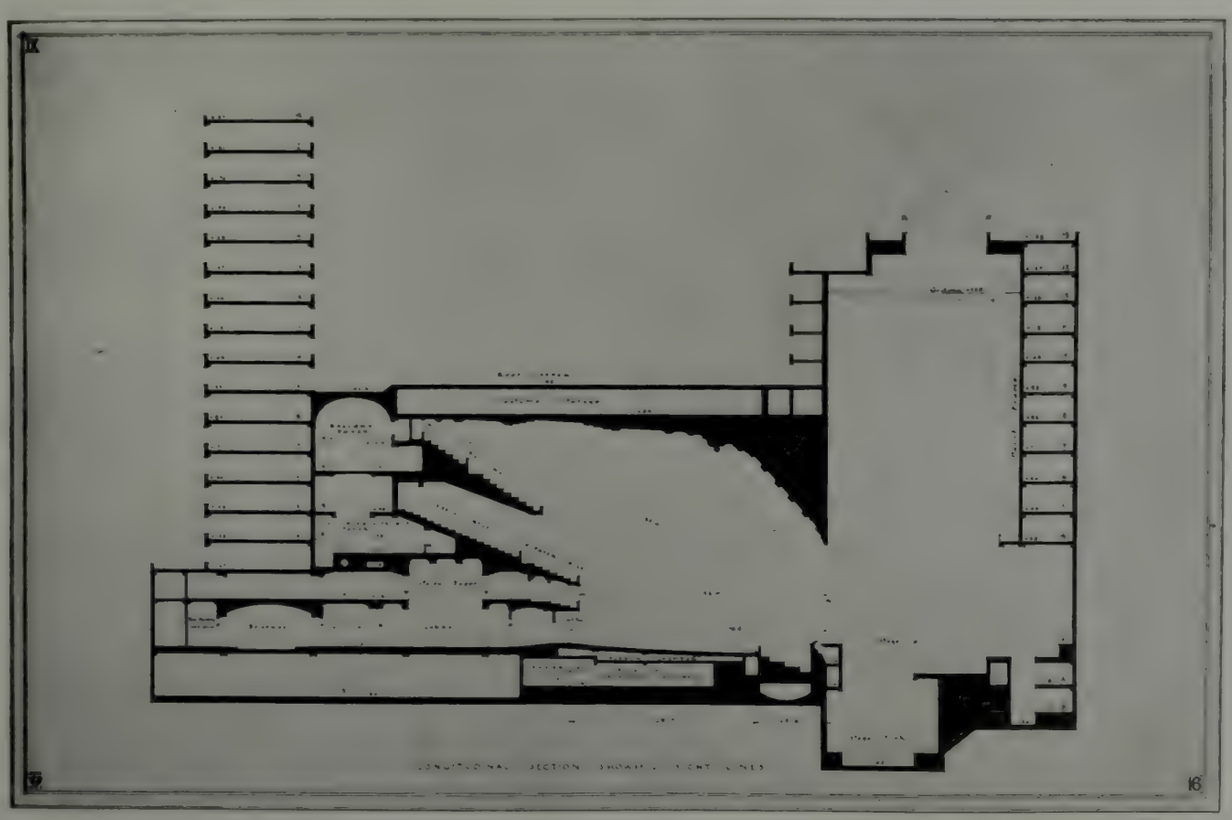


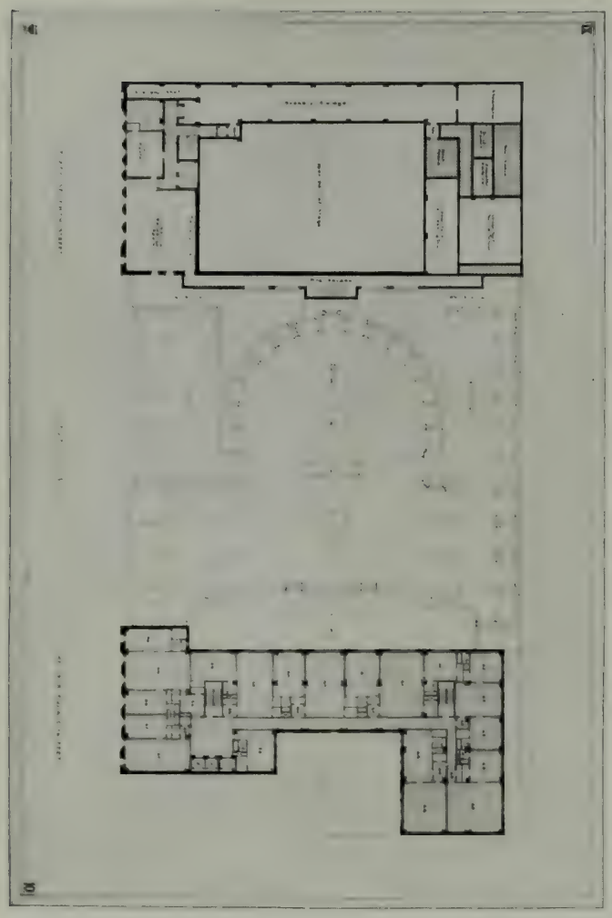
Proposed Scheme for METROPOLITAN OPERA HOUSE, New York City; JOSEPH URBAN, Architect.

In addition to the opera house proper, provision was made for studio apartments for opera stars, playgrounds for children and gardens on the roof.

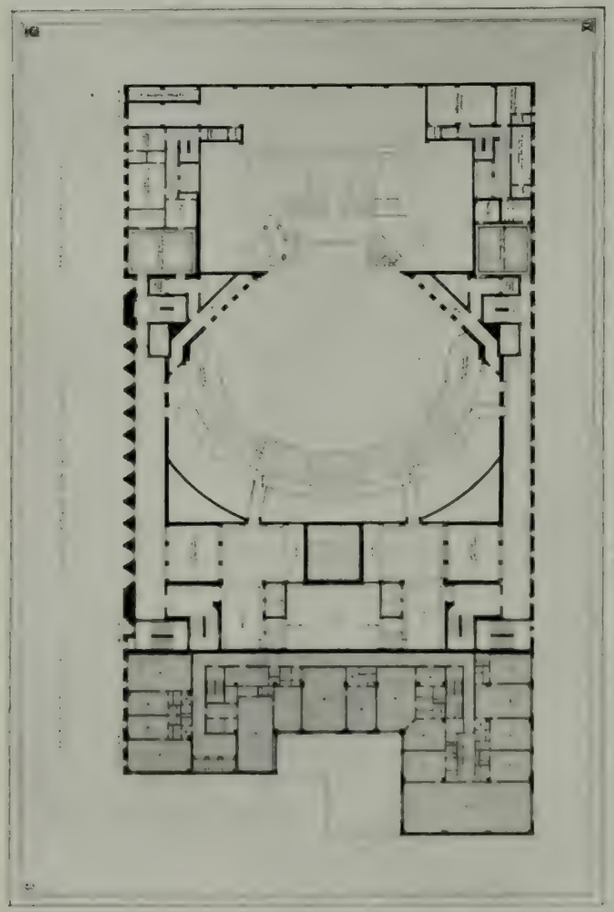
The entire scheme was worked out to meet the very exact requirements of opera production.

Box holders have a private automobile entrance that passes through the building. The separate entrance for impressarios is by an underground passage.





Above, ROOF PLAN; below, FOYER CIRCLE AND OPERA CLUBS, of a proposed METROPOLITAN OPERA HOUSE for New York City; JOSEPH URBAN, Architect



illustrated, (page 460) as an example, we will find the height of the eye in the last row of the auditorium.

e_1 (8 spans, @ 32″, from focal point)=0.33′.
(i.e., eye level in first row is 4″ above focal point.)

d_1=21.33 (table) (actually 22′6″ but by using 21.33 any discrepancy is in favor of better conditions).

e_{37}=unknown to be found.

d_{37}=120 ft. (see table.)
[1st row is 8 spans from focus, 37 additional rows is then 45 spans from focal point, or 120′.]

Setting up the formula with values substituted we have

$$e_{37}=\left[\frac{.33}{21.33}+1/9\left(\frac{1}{21.33}+\frac{1}{24.00}+\ldots\frac{1}{117.33}\right)\right]120.00$$

The parenthesis is the sum of the reciprocals of the distances of the first row to one less than the row in question. These reciprocals are given conveniently for a 32-inch seat spacing in the table, if a simple subtraction is made.

For example: The value of the sum of reciprocals between 16′ (where table begins) and 117.33′ (which is one space less than 120′) is seen from the table to equal .783513 (which is read opposite 120′ in the table). The value of the sum of the reciprocals between 16′ and 18.67′ (one space less than 21.33) is .116062 (opposite 21.33). The value of the sum of reciprocals between 21.33′ and 117.33′ is therefore equal to the difference between .783518 and .116062 or .667451.

Thus the formula becomes:

$$e_{37}=\left[0.155+\frac{.667451}{9}\right]120$$

e_{37}=10.76′ (Level of eye in 37th row)

Other levels may be found at any row and the curves for auditorium and balcony so determined.

Having found the eye height in the last row of the auditorium, the next step is to locate the level of the eye in the first row of the balcony. The balcony must be above the vision line determined by the eye level in the last row of the auditorium and the top of the screen. Also, the balcony should not be nearer the stage than the intersection of the above mentioned line of vision and a line with a rise of 16 to a run of 33, starting at a point 8 feet below the focal point. Having found this point, we can easily pick a row (from the table) a little further from the stage than this point.

With this lower edge of the balcony established on the vision line, set slightly behind the intersection mentioned, the eye height can be determined by adding 1′2″ for construction of balcony and 3′8″ for height of eye from floor. The distance of the eye from the front of the balcony must also be considered (4′).

With this distance and height it is a simple matter to find the height of the eye in the last row of the balcony. Other points may be found in the same manner.

It will be seen that the height of the theatre is determined by the conditions of good vision, inasmuch as the height of the eye in the last row balcony less 3′8″ gives the floor height. The necessary 9 feet headroom determines the underside of the projection booth. The



Above, SKETCH OF FOYER; below, PLAN AT 82-FOOT LEVEL, of a proposed METROPOLITAN OPERA HOUSE for New York City; JOSEPH URBAN, Architect

main steps of the computations for the typical theatre described in this article are given below in a simplified form.

1. By referring to diagram the steps may be easily followed to determine the height of the eye in the *last row of the auditorium*.

e_n = ? (to be calculated when n = 37th row)

e = 4″ or .33′

d = 21.33 (first row auditorium) 8 spans @ 32″ from focus

c = $\frac{1}{9}$

d_n = (for 37th row or 45th span, at 32″ spacing from focus)

$$e_{37} = \left[\frac{.33}{21.33} + \frac{1}{9}\left(\frac{1}{21.33} + \frac{1}{24} + \cdots \frac{1}{117.33}\right)\right] 120$$

$\Sigma R\ 120 = .783513$

(Sum of Reciprocals)

$$\Sigma R\ 21.33 = \frac{.116062}{9\,|\,.667451}$$

$$.074161$$

$e_{37} = (.0155 + .074161)\ 120$

e_{37} = 10.76′ eye level in last row of auditorium

2. To determine height of eye in *first row balcony*.

By solving similar triangles (the distance of last row from the screen and the height of the screen being known) the vertical from the underside of the balcony to the horizontal through the eye of the last row spectator is found to be 8.18′. The height of the eye in the first row balcony is the height of eye in the last row of auditorium (10.76′) + the vertical (8.18′) + construction (1.33′) + height of eye of seated person (3.67′). This gives 23.94′ for eye height from stage floor (datum level of focal point).

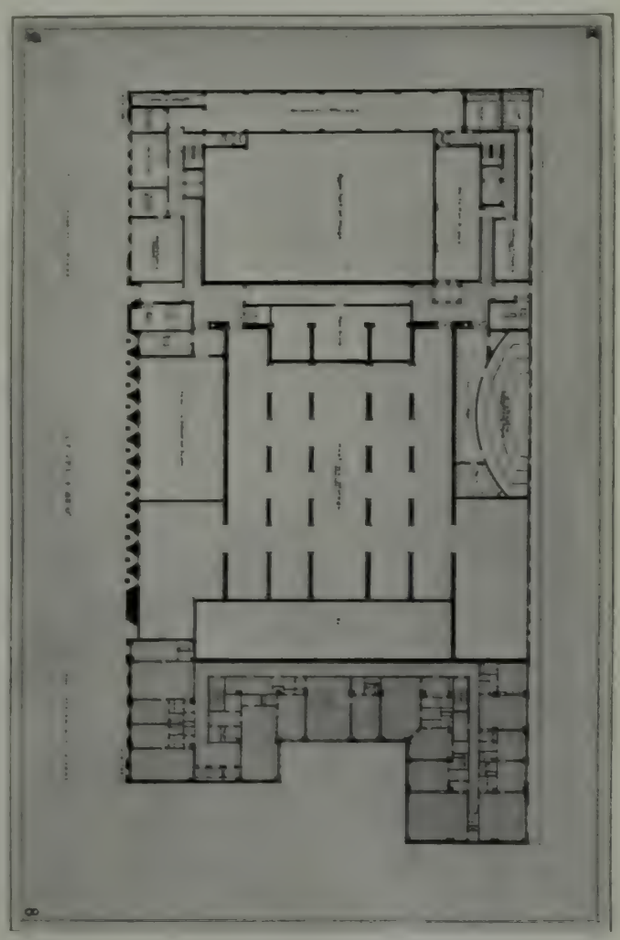


TABLE OF RECIPROCALS for Determining Eye Height (See text beginning on page 461).

TABLE FOR 32" ROW SPACING Spacing = 32" = 2.67'			TABLE FOR 36" ROW SPACING Spacing = 36" = 3'		
distance in feet	K (No. of Row) d–s	Reciprocal	distance in feet	K (No. of Row) d–s	Reciprocal
16.00	6	0.000000	15	5	.00000
18.67	7	.062500	18	6	.06665
21.33	8	.116062	21	7	.12221
24.00	9	.162944	24	8	.16982
26.67	10	.204611	27	9	.21148
			30	10	.24852
29.33	11	.242106	33	11	.28185
32.00	12	.276201	36	12	.31215
34.67	13	.307451	39	13	.33992
37.33	14	.336294	42	14	.36556
40.00	15	.363082	45	15	.38937
42.67	16	.388082	48	16	.41159
45.33	17	.411518	51	17	.43242
48.00	18	.433578	54	18	.45203
50.67	19	.454411	57	19	.47055
53.33	20	.474147	60	20	.48809
56.00	21	.492898	63	21	.50475
58.67	22	.510755	66	22	.52062
61.33	23	.527799	69	23	.53577
64.00	24	.544104	72	24	.55026
66.67	25	.559729	75	25	.56414
69.33	26	.574725	78	26	.57747
72.00	27	.589149	81	27	.59029
74.67	28	.603037	84	28	.60264
77.33	29	.616429	87	29	.61454
80.00	30	.629361	90	30	.62603
82.67	31	.641861	93	31	.63714
85.33	32	.653957	96	32	.64789
88.00	33	.665676	99	33	.66830
90.67	34	.677040	102	34	.66840
93.33	35	.688069	105	35	.67820
96.00	36	.698784	108	36	.68773
98.67	37	.709201	111	37	.69699
101.33	38	.719336	114	38	.70600
104.00	39	.729205	117	39	.71477
106.67	40	.738820	120	40	.72332
109.33	41	.748195	123	41	.73165
112.00	42	.757342	126	42	.73978
114.67	43	.766271	129	43	.74771
117.33	44	.774991	132	44	.75546
120.00	45	.783513	135	45	.76304
122.67	46	.791846	138	46	.77045
125.33	47	.799998	141	47	.77770
128.00	48	.807977	144	48	.78479
130.67	49	.815790	147	49	.79173
133.33	50	.823443	150	50	.79856
136.00	51	.830943	153	51	.80523
138.67	52	.838296	156	52	.81177
141.33	53	.845507	159	53	.81818
144.00	54	.852583	162	54	.82447
146.67	55	.859527	165	55	.83064
149.33	56	.866345	168	56	.83670
152.00	57	.873042	171	57	.84265
154.67	58	.879621	174	58	.84850
157.33	59	.886087	177	59	.85425
160.00	60	.892443	180	60	.85990

3. To determine height of eye in *last row of balcony*.

$e_n = e_{27}$ = (27th row of balcony + 24 spans @ 32" from focus)
$e_1 = 23.94'$
$d_1 = 64.00$ (distance from focal point to eye in first row balcony)
$d_n = d_{51} = 136'$ (distance to eye in 27th row balcony)

$$e_{27} = \left[\frac{23.94}{64.00} + \frac{1}{9}\left(\frac{1}{64.00} + \frac{1}{72} + \cdots \frac{1}{133.33}\right)\right] 136$$

$\Sigma R\ 136 = .830943$

$\Sigma R\ 64.00 = .544104$

$9 \mid .286839$

$.031871$

$e_{27} = (.3738 + .031871)\ 136$

$= 55.18'$ height of eye in last row balcony.

By similar computations, other points in the curve may be determined. The section is always a flat curve at the beginning getting steeper progressively to the rear.

It is advisable to compute the last two rows of the balcony so as to be sure that the rise per row is not greater than that allowed by law (1'9").

For differently spaced rows other tables are necessary.

The method of making a table, using for example 36" spacing, follows:

List the distance starting with about 15 feet since no row is likely to be closer to the stage than this, due to the orchestra pit. These distances are shown in the first column.

For convenience, list the number of spans from the focus in the second column.

In the third column set down the reciprocals of the distances in the first column.

Set zero in the fourth column opposite the initial distance of the table (here opposite 15 feet).

Column I Distance In Feet	Column II Space From Focal Point	Column III Reciprocal of distance	Column IV Sum of Reciprocals
15	5	.06666	.00000
18	6	.05555	.06666
21	7	.04761	.12221
24	8	.04166	.16982

The reciprocal of 15 is placed opposite 18 and the sum of these is placed opposite 21. This sum plus the reciprocal of 21 is placed opposite 24.

All items continue, except that the sum of reciprocals is made to include only up to the reciprocal of the next previous distance in order that the table read the sum of reciprocals from the start up to and including the last distance proceeding the one in question.

$$\text{i.e., } \left(\frac{1}{d} + \frac{1}{d_2} + \frac{1}{d_3} \cdots \frac{1}{d_{n-1}}\right)$$

The result is the table which is shown at the left.

II. PRODUCTION REQUIREMENTS

A. Projection Room.

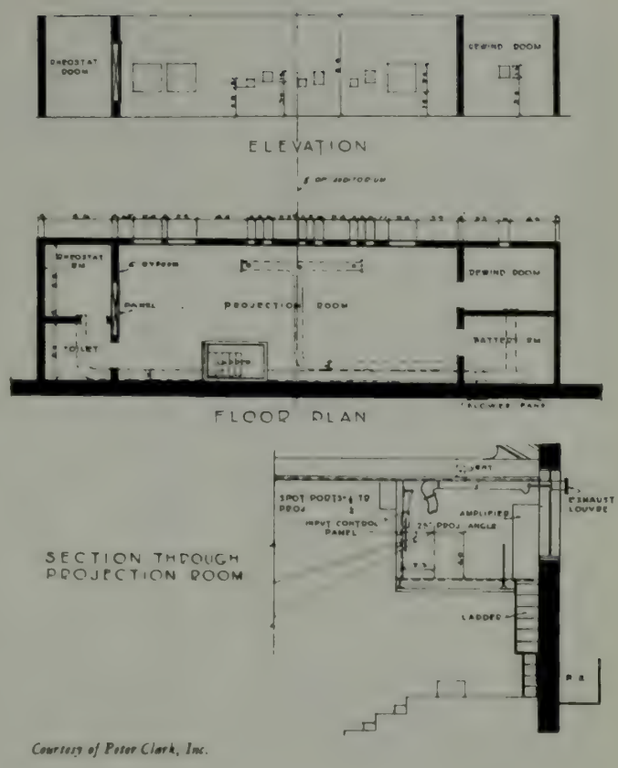
The projection room should be drawn 12 feet out from the rear wall with the under-side of the floor 9 feet above the rear floor of balcony. The line of sight should be established 4 feet above the floor of the booth. The projection angle should not exceed 25°. Lines indicating clearance of spotlight should be drawn from this outlet to the auditorium edge of the orchestra pit and to the under-side of the proscenium arch. A vertical line 6 feet long should be drawn at the forward point in the balcony to indicate that a person standing would not interfere with light from projection booth. This would seem to be a simple precaution but has, at times, been overlooked.

B. Stage.

1. types. The simplest type of stage, which is to be avoided whenever possible, is that with little or no fly space. Such stages are too often installed in schools, hotel ballrooms, and other similar places, and are a great handicap even to amateur productions. If there is absolutely no way to get fly space over the stage, a plaster sky dome may be constructed, few hanging pieces being necessary with this type of stage. Great care must be taken in the design and finishing of such a dome because the slightest variation in the flow of the curves will distort the lighting. A light trench 4 feet wide should be built in the floor in front of the dome. Sometimes a hung grid is used, with a saving of the space above it; but hung grids are not really satisfactory. On stages used primarily for purposes other than dramatic production a portable grid can be used.

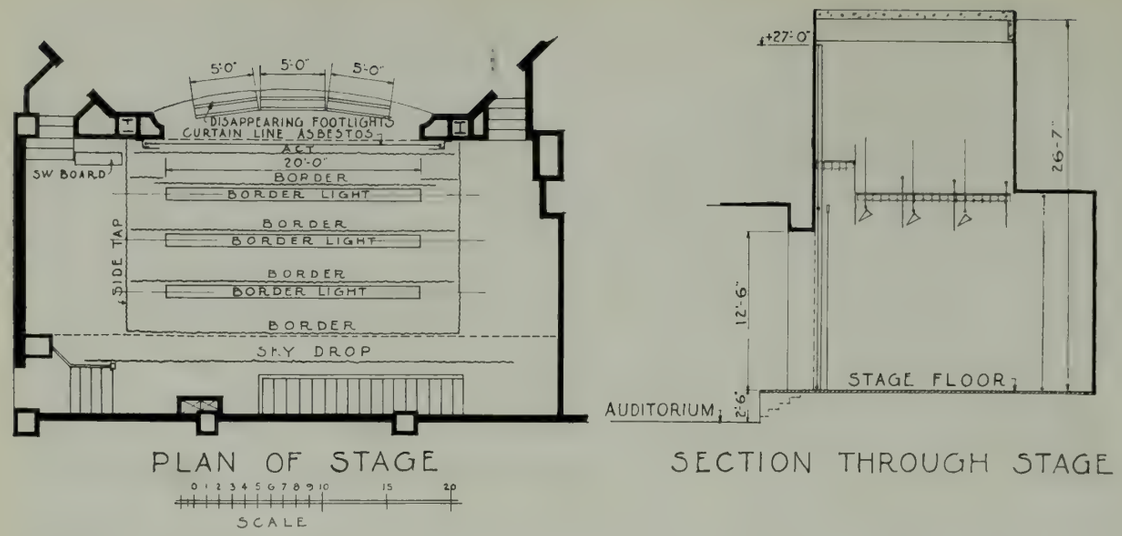
The usual type of theatre used for legitimate production is that with very generous loft space and is discussed in detail below. Sometimes, especially in Europe where the stage is very deep, permitting scenery in front of dome, a sky dome is constructed. The Dresden Court Theatre has one that is hinged so that the dome part may be swung back out of the way for hung scenery.

Then comes the more elaborate type with two or more stages mechanically operated so that while one set is being used the next can be set up, making a very quick change of scenery even with elaborate sets. These stages are devised in various ways. First there is the revolving stage which is more often used than the others because it takes up less room; next there is the wagon stage. This type is constructed so that there are two stages running on one set of rails, one being before the proscenium opening while the other is off to one side out of vision. This necessitates a total stage width of a little more than three times the proscenium opening. Sometimes a third stage is built so that it will roll to the rear of the playing area. Another, and probably the most complicated, system is that which has a set of stages and tracks as described above, but located in the cellar. In this case the set to be used is rolled into position below the stage and then raised to stage level by an elevator. When the act is finished the set is lowered, moved off the elevator, the next is slid on and in turn raised up.

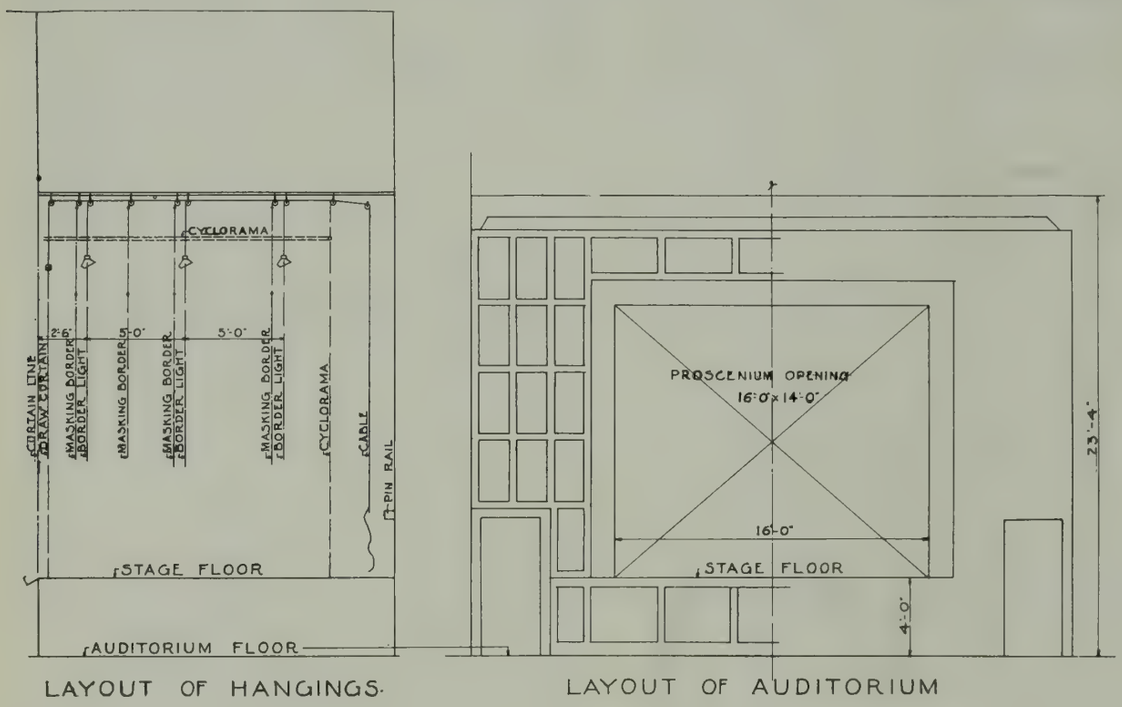


Courtesy of Peter Clark, Inc.

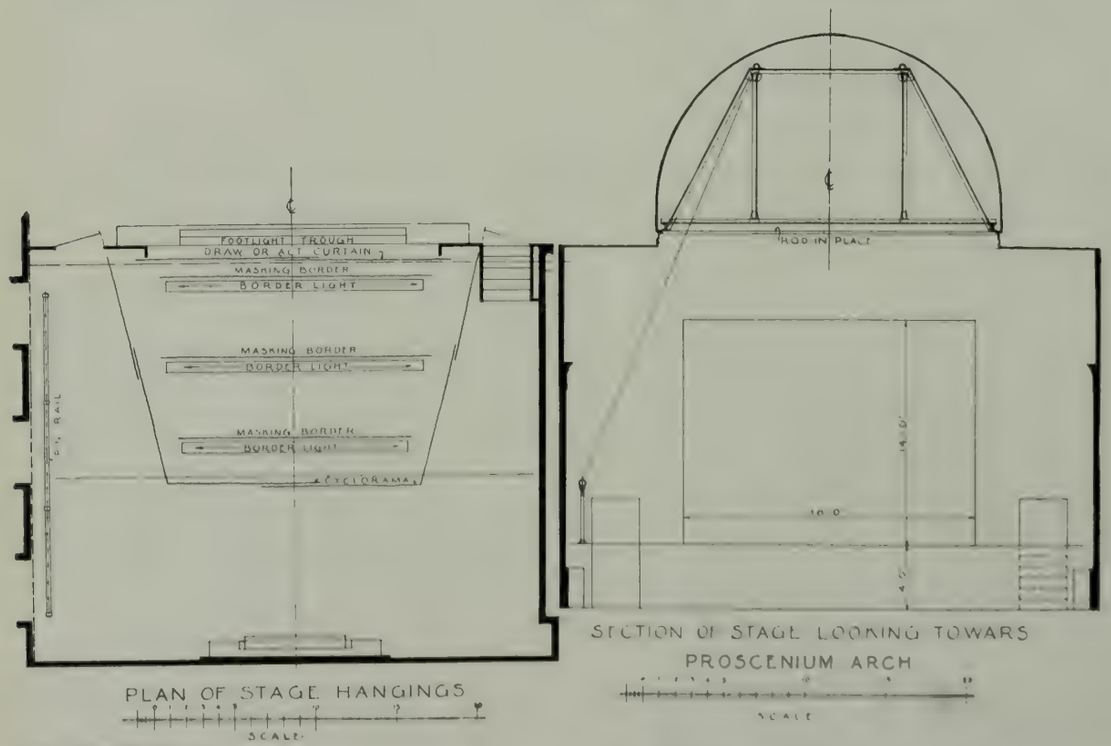
Details of a PROJECTION ROOM on the NEW AMSTERDAM THEATRE ROOF, New York City



a. West Side Branch, Y.M.C.A., New York City; Dwight James Baum, Architect

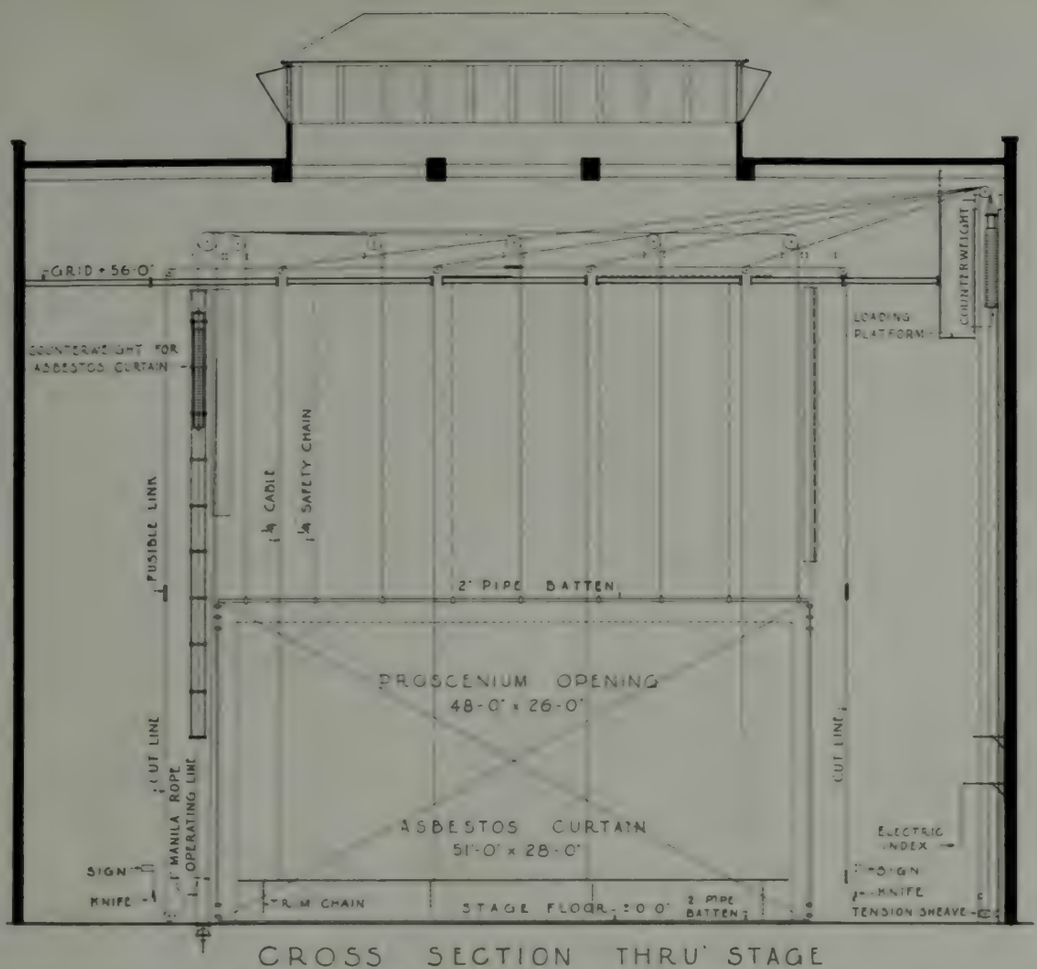


TWO TYPES OF LITTLE-THEATRE STAGES



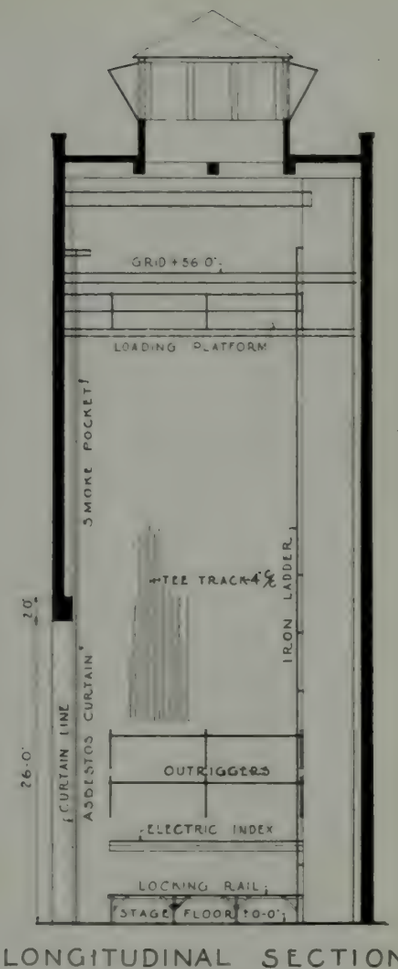
(Courtesy Peter Clark, Inc.)

b. Union College, Schenectady, N.Y.; Peter Clark, Inc., Designer



CROSS SECTION THRU' STAGE

LOOKING TOWARDS PROSCENIUM OPENING SHOWING COUNTERWEIGHT SYSTEM & ASBESTOS CURTAIN RIGGING



LONGITUDINAL SECTION THRU' STAGE

Courtesy of Peter Clark, Inc.

STAGE DETAILS OF A TYPICAL THEATRE

2. DIMENSIONS. The stage is about four times as large as the part that is visible to the audience.

The height of the proscenium should be fittingly proportioned to the width, with a minimum of about twelve feet for small amateur theatres. A stage too low and too narrow will throw the human figure out of proportion to its surroundings on the stage. For the average legitimate stage we may assume a 45-foot proscenium opening (in movie and opera houses it may be larger, depending on size of auditorium. See table) and not less than 35 feet high. A false proscenium may be used to reduce this to scale of scene being used. The aggregate off-stage space right and left should then equal about 45 feet, making the total width of the stage at least 90 feet. The depth of the stage should be not less than 30 feet; 45 is preferable. The height of the stage from floor to "rigging loft" should be not less than 65 feet; more height is desirable.

Typical examples of stage dimensions are given in accompanying table:

		General Dimensions				
		Proscenium		Stage		
		Width	Hgt.	Width	Hgt.	Depth
Amateur	Provincetown	20′	10′	30′		16′
Legitimate	Belasco	35′	20′	55′	60′	30′
Musical Comedy	Globe	40′	25′	75′	90′	35′
Opera Houses		50′	30′	90′	90′	60′

On the next two pages are two views of the LITTLE CARNEGIE PLAYHOUSE, New York City; WOLFGANG AND POLA HOFFMANN, Architects. At the left is shown the entrance; at the right, the picture gallery. The plan includes bowling alleys


CONTINUOUS NOON TO MIDN
THE 10 DAYS THAT SHOOK THE WORLD
CARNEGIE
PLAYHOUSE
MOTION PICTURES
OF DISTINCTION





AUDITORIUM OF THE LITTLE CARNEGIE PLAYHOUSE, New York City; WOLFGANG AND POLA HOFFMANN, Architects

These measurements, while customary, are not ideal, and are the result of the more or less arbitrary dimensions imposed by high land values.

The off-stage space at the sides is particularly important. Without it, entrances to the scene are cramped, there is no place to pack furniture and scenery for other acts than the one in progress on the stage, and there is no place for the actors to await their entrances. Such space is needed, often, for the suggestion of other rooms than the one before the audience, and an important part of the lighting of the scene is done from the sides.

The best position for the lighting control board of standard size seems to be one on a line with the proscenium wall either on the floor of the stage, or elevated above it so as to be out of the way of the actors and stage workers. However, the latter kind is apt to be a bit inaccessible. Some boards have been placed ahead of the proscenium arch at the side of the auditorium so that the operator can see through an opening what the effect of the lights is on the stage. The operator should, however, be within constant communication with the stage manager.

3. OFF-STAGE FACILITIES.

a. Entrance. It is well to contrive the building so that a central entrance corridor from the street (with door-



SOCIAL ROOM of the LITTLE CARNEGIE PLAYHOUSE, New York City; WOLFGANG AND POLA HOFFMANN, Architects

man's office, time clock, receiving window) controls the access to the stage, the dressing-room corridors, shops, cellar, stairs, and front of the house. When many doors open on the stage, it is difficult to find space for the stacking of scenery without blocking them.

b. Requirements at the stage level.

(1) At least one and preferably two or three quick-change dressing rooms should be located near stage.

(2) Green room about 15 by 25 feet, located on dressing room side.

c. Rooms that may be located on other levels. The following rooms should be grouped together on one or more levels preferably on the side of the stage entrance.

(1) Dressing rooms.

Two or more individual dressing rooms for stars.

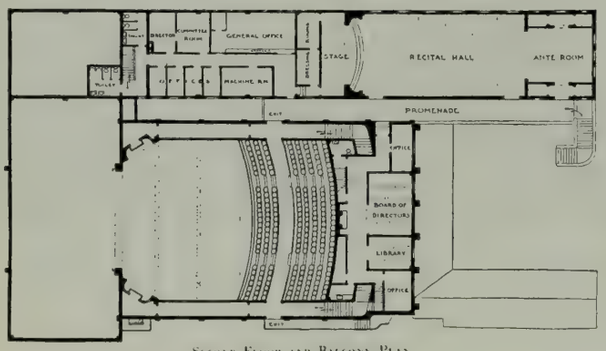
From fifteen to forty double dressing rooms for supporting cast. Twenty may be taken as average.

A minimum of two chorus dressing rooms to accommodate twenty actors each. (An opera house should have chorus rooms for 300 people.)

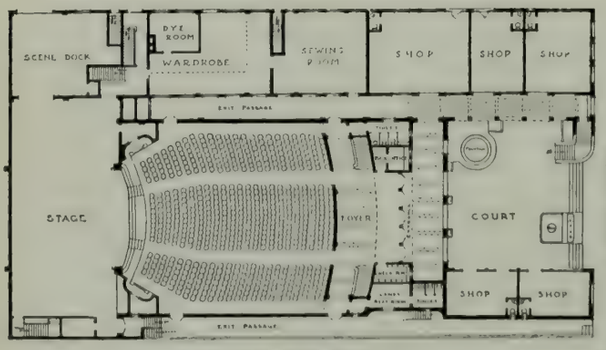
Dressing rooms should contain make-up tables for two actors with mirrors, full length mirror, lockers, wardrobe, drawers, wash basin, and shower baths.

(2) Hair dressers' room should be located conveniently to dressing rooms.



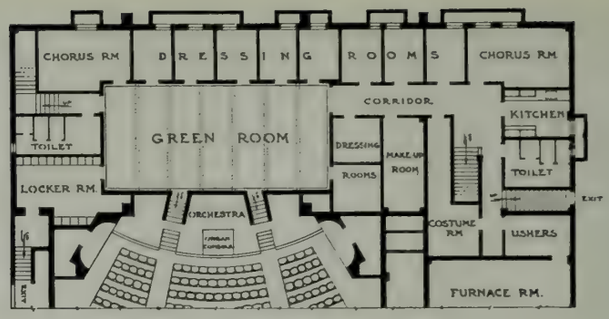


Second Floor and Balcony Plan



First Floor Plan

Pasadena Community Theatre — Elmer Grey, Architect, with plans showing the arrangement of off-stage facilities.



Basement Plan

(3) Wardrobe room.

In the ideal theatre two rooms should be set aside for the wardrobe, one for the making of clothes and another for their storage. The sewing room, needless to say, should be well lighted, should have a space partitioned off as a fitting room, should be provided with proper closets in which to hang dresses in the process of making and should be large enough to allow for a number of seamstresses and a large cutting table. There should be a built-in closet equipped with shelves and drawers in which to store clothes, trimmings, and findings, for the making of costumes. For the costume storage room, a loft space that might otherwise go to waste can often be utilized. This room should have long closets, fitted with bars on which dresses can be hung, and should have drawers in which other items of dress can be packed—hats, shoes, wigs, stockings, tights. These drawers should be numerous enough to allow for the sorting out of costumes by colors or periods.

(4) The property department with a shop for the making of furniture, papier-mache, and other property work, and a current production storage room in which furniture and other stage furnishings can be stored. Often one large room can be made to do for both.

(5) Mechanics' rooms.

The remainder of the units, as listed below, may be located according to the individual requirements of the problem.

The office for the stage manager must be close to the stage.

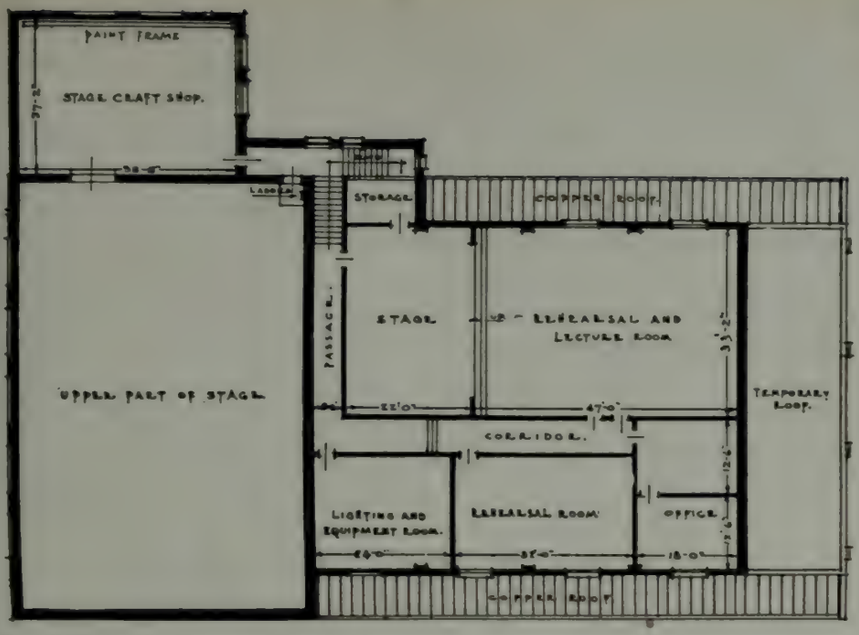
"Each of the mechanical departments should have its two rooms, one a shop and the other for storage.

The carpenter, if the scenery is built in the theatre, often can use the space under the stage (where legal). If he cannot build his scenery there, either another place about 18 by 35 feet should be set aside, or the scenery should be built outside the building. He should not use the stage. It must be kept free for rehearsals. He should, however, have a room in which to keep his tools, draw his plans, and file his ground and framing plans, bills, and time sheets.

The electrical department likewise must not be overlooked. A room about 15 by 30 feet is a good size. There must be closets for the keeping of incandescent bulbs, lamp dyes, plugs, connectors, cable, wire and other electrical hardware, gelatines, color frames, etc. There must be provision in the shop for the dyeing of lamps, testing, repairing, etc."

The scene painters' shop requires a room about 12 by 40 feet and 20 to 40 feet high. The smithy, containing forge, drill, etc., requires a room about 10 by 15 feet.

"The property and electrical departments, like the carpenter's, must also be fitted in a sense as offices, for the keeping of electric and property plots, full records relating to past and coming productions, bills, orders, receipts, time sheets, and similar data.



It may be objected at this point that these various demands presuppose a large-sized plant with elaborate equipment. As a matter of fact, they apply quite as much to the tiniest of little theatres—even more so, for in such, proper ordering or space and isolation of separate activities is equivalent, in getting efficiency, to more ample space less carefully sub-divided. For, inevitably, these various kinds of work must be done in the theatre, and the people who do them must find space here or there for their work, and the things they make must be kept somewhere. Unless each job and each product is assigned its proper corner, the building is soon a clutter of stuff, accumulating dust, getting jostled about and broken. Then we are back at the old, dark, dirty theatre we are trying so hard to improve upon. The provisions discussed above, though they are not on the stage, are very much a part of it, and go far toward making it an instrument of precision.

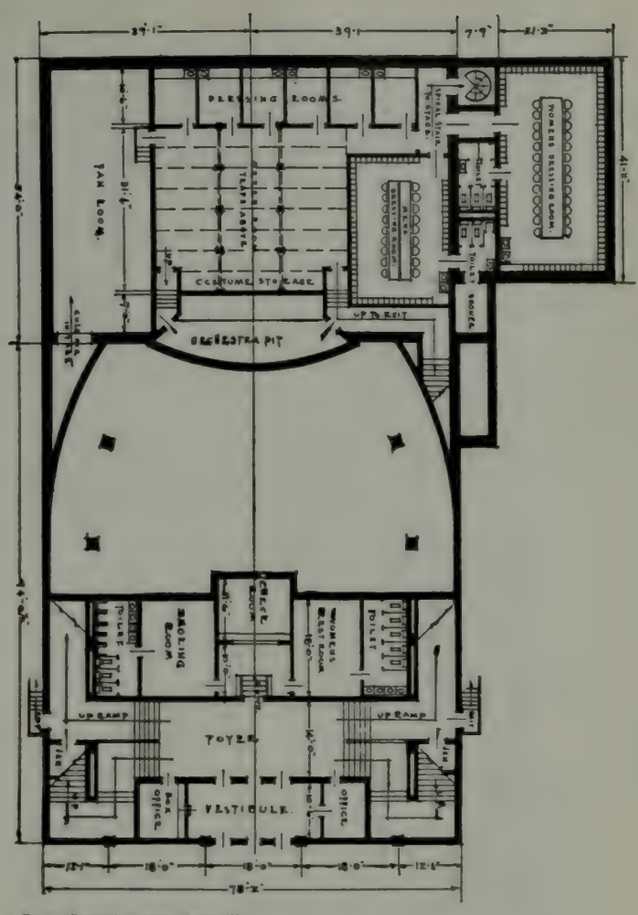
In community buildings and schools, the various workshops, rehearsal room, etc., can often be combined with rooms serving other purposes. In any case some provision for them is quite as important as the open stage itself."[1]

(The number at the end of each quotation refers to the number carried by the book in the bibliography at end of article.)

4. STAGE EQUIPMENT.

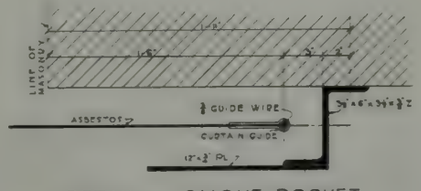
a. Curtains. A fire and smoke-proof curtain must be installed at rear of proscenium opening. It is usually made of asbestos cloth. There are also other types of curtains; a steel and asbestos curtain combined with steel face on the auditorium side and 1" thick asbestos on the stage side. The other and newer curtain now being used extensively is the double asbestos curtain with wire insert on steel channel frame, forming a thickness of 120th part of the curtain width. These three curtains are approved and used in many cities. Some of them are compulsory. They must in all cases be arranged to lower automatically without manual labor in case of fire.

Directly behind the asbestos curtain, an act curtain should be installed. This curtain can either fly, draw or tableau. This can be done with one curtain but the height of the opening governs the complete operation of the three in one. The tableau part of the curtain is principally used for making calls or entrance through the center of the curtain. The drawing is used in the legitimate theatre for cutting down width of the opening, forming tormentor legs which tie up with the



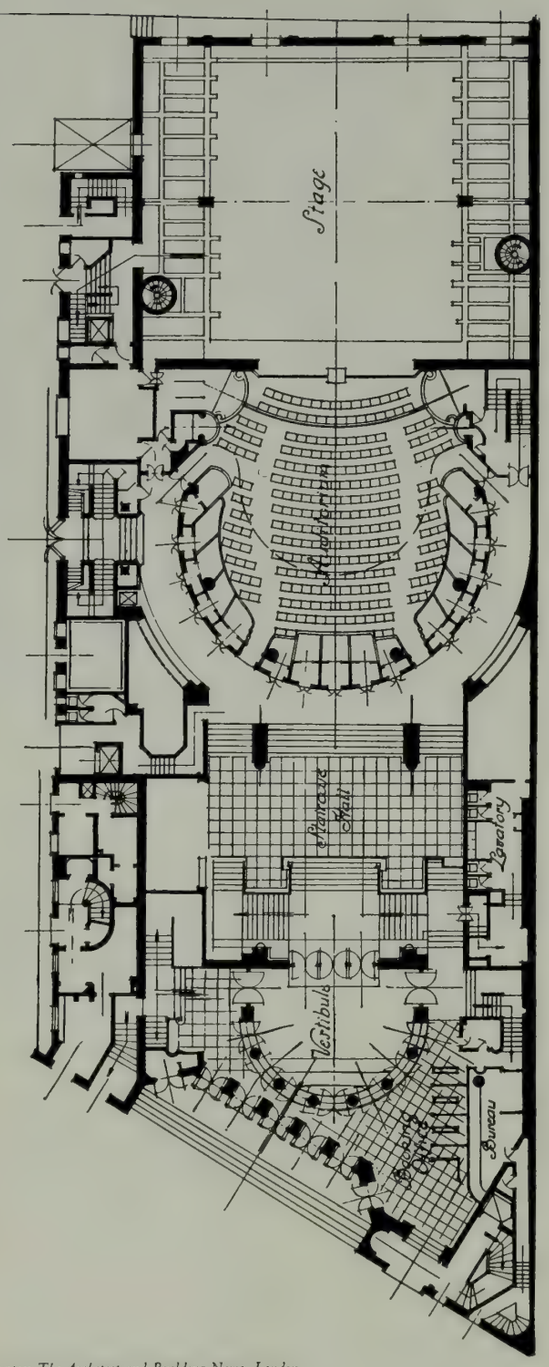
From "Footlights Across America"

PROJECTED THEATRE FOR THE UNIVERSITY OF IOWA, Iowa City; BOYD AND MOORE, Architects. In addition to the well-planned and extensive off-stage facilities shown here, there is a carpenter shop at the stage level.



DETAIL OF SMOKE POCKET

A STANDARD INDICATION OF THIS REQUIRED FEATURE



Courtesy The Architect and Building News, London.

The THEATRE PIGALLE, Paris; CHARLES SIDIS, JUST AND BLUM, Architects

"The stage is over 70 ft. wide and 68 ft. deep, and it is so arranged that four complete settings can be shown in rapid succession. This is arranged by a system of two stages, one below the other, the upper of which can be hoisted into the flies complete with its setting, leaving the lower one in position at proscenium level. Each of these stages is also divided transversely into two sections of full width but half depth, so that if desired each may contain a set. As each section is independently controlled, the settings can be mounted and then interchanged with great rapidity." — The *Architect and Building News*.

valance directly in front of the proscenium and in front of the asbestos curtain. The up and down motion of the curtain must be very fast and it must operate easily.

b. Screen. The screen should be located 7 or 8 feet back of the curtain line and the bottom not less than one foot above the stage. Screens are not of exactly the same proportions, due to the angle of projection, but are roughly of the proportions 1 x 1⅓. The distance from the projector has no bearing on the size of the screen. In providing space for screen it is well to bear in mind that with improvements and new developments in the movie industry it is very likely that new screens of greater size may be used in the near future. The "Grandeur" screen in Roxy's Theatre, New York, is 40 feet wide by 28 feet high.

TABLE OF SCREEN SIZES

Theatre	Capacity	Size of Picture
Roxy (New York City)	6200	24′8″ x 18′6″ (40′ x 28′ Grandeur)
Fox (Detroit)	5046	21′2″ x 17′1″
Fox (St. Louis)	5038	22′0″ x 17′8″
Fox (Brooklyn)	4100	20′0″ x 15′7″
Fox (Washington)	3400	20′0″ x 16′0″
Fox (Philadelphia)	2446	18′0″ x 14′5″
Locust (Philadelphia)	1580	18′0″ x 13′6″

c. Scenery Equipment.

"Scenery is of two types: pieces that are suspended from ropes (hanging pieces), and pieces that stand on the floor (set pieces). For exterior scenes, the first type includes drops, 'borders' representing foliage, leg-drops, trees, pillars, and arches or sections of wall, house-front, or other flat architectural units, large enough to warrant hanging overhead when out of use, so as to save floor space; and—for interior scenes—ceilings and back walls. The second type includes, for exterior scenes, any low-standing units, such as walls, hedges, fences, tree trunks, 'wings' or set-houses; and for interior scenes, the side-walls of the room and very often part or the whole of the back wall.

The matter of storage space for scenery is to be determined wholly by the amount of space at the builder's disposal and the use to which the theatre is to be put."[1]

Scenery is usually built to go through a box car door (5′9″ x 8′6″). Larger pieces are built hinged or in sections.

1. SCENE DOCK. If many productions are to be made, a space to accommodate such pieces standing on end should be provided for in a scene dock, adjacent to the stage but separated from it by a wall and fireproof doors. Scenery should not be allowed to accumulate on the stage. The theatre of the Carnegie Institute of Technology at Pittsburgh has an excellent dock.

2. LOADING DOORS. Loading doors which will accommodate any standard size scenery should be provided directly from the stage to the street or alley. These doors should have following dimensions:

Minimum — 7′6″ x 8′6″
Legitimate house — 12′0″ x 18′0″ (high)
Opera houses — 16′0″ x 30′0″ (high)

3. GRIDIRON. For the manipulation of hanging scenery one of the most important parts of the stage is the steel gridiron. This is made of steel channels and I-beams with 3″ channel or flat iron floor laid over I-beams for walkway. This should be 55 feet to preferably 65 feet above the stage floor in the average theatre.

The space underneath the beams supporting the roof to the gridiron floor can be as low as 5 feet. The gridiron mentioned above is arranged with slots for lines designed for the various width openings. Openings from 30 feet to 35 feet would be a 3-line opening; 37 feet to 50 feet would be a 4-line; 50 feet to 60 feet would be a 5-line opening; where openings are greater as in auditoriums, they average up to 6, 7, 8 or 9 lines as in the auditorium at Atlantic City. The spacing of slots in the gridiron can be as wide as 14′6″ and the best average is 13′0″. These lines, needless to say, should be of the best grade manila rope.

The ends of these lines in each set are brought together at one side or the other of the stage, so each set may be operated as one. On the side to which the lines are led is located the pin-rail, either on a fly-gallery or at the floor level.

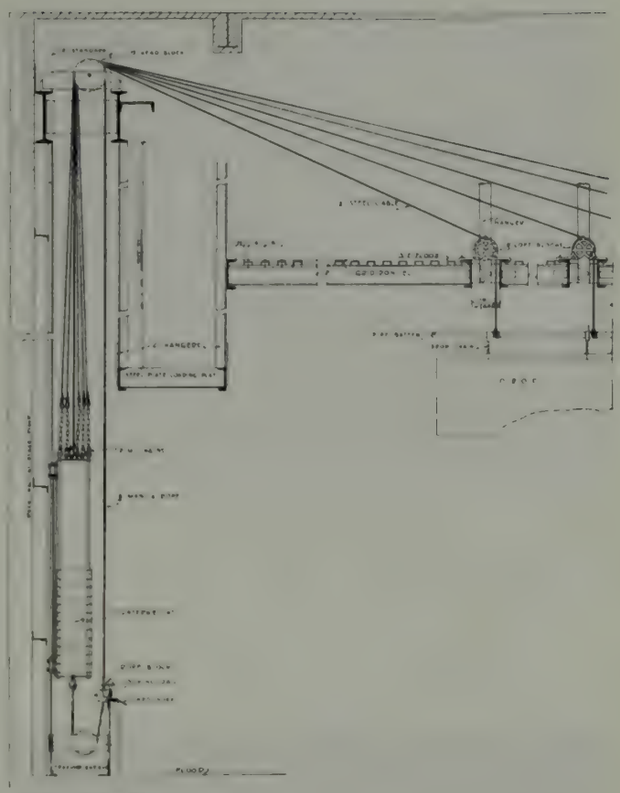
4. COUNTERWEIGHT SYSTEM. In newer theatres, large or small, the tendency of the day is to use the counterweight for handling scenery. This method is quicker and safer than any other yet developed for hanging drops, flats, wings, ceilings, and everything that is flown on the stage. In most cases it eliminates the fly gallery and brings operations to the stage floor. Signal systems are replaced by the *locking rail* from which scenery is released, each line having a card index system of its own. The two types of counterweight system—one with steel tee bar rails, the other with a wire guide—are entirely alike except as to guide rails.

The counterweight frames for the larger theatres run up to 12 feet in length, and for smaller theatres up to 6 or 8 feet, giving sufficient space in each case for equally balancing the drop, border lights, lightest curtain, or heaviest flat, without any interchange of weights. The weights principally used in the counterweight system average 10 lbs. to the inch. They are 3 inches wide, and 1, 2 or 3 inches deep, weighing 10 lbs. for every inch of depth.

The depth of the cellar (*sink*) depends on the type of equipment used to change the sets. If the stage is of the usual type with traps, the finished floor height may be 9′ 6″.

If the stage is equipped with electric or hydraulic elevators (*bridges*) the sink may be from 30 feet to 40 feet below stage level. (In this instance, if there is to be a *one-basement level*, the excavation should be deep enough so that the elevator or stage trap when it is down comes flush with the basement floor.)

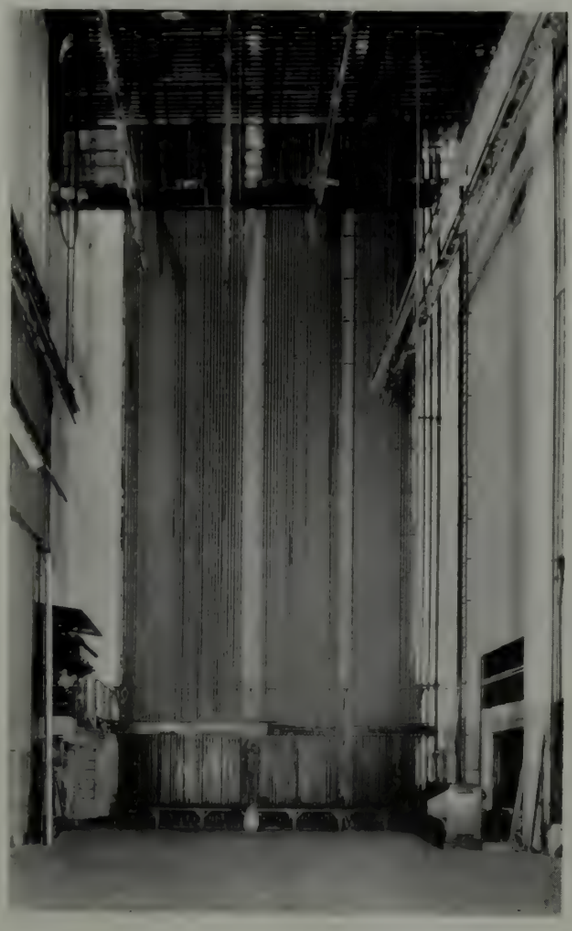
If a plain revolving stage is used, there must be room enough for the machinery as well as access to the traps (10 or 15 feet).

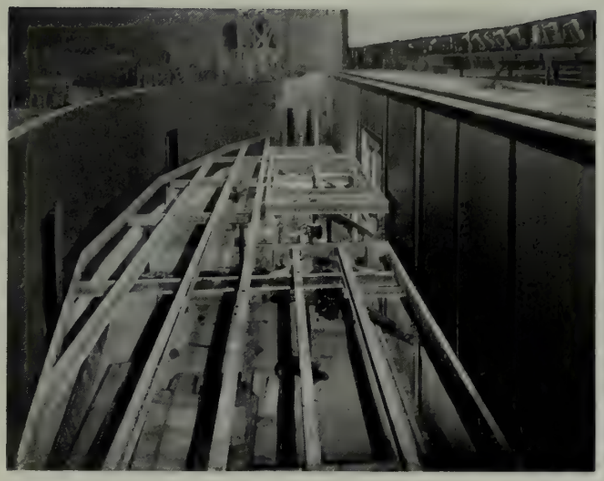


Courtesy Peter Clark, Inc.

Above: Essential Details of a GRIDIRON AND COUNTERWEIGHT SYSTEM. (See text at left)

Below: COUNTERWEIGHT FRAME in the Temple of the Scottish Rite, Philadelphia; by PETER CLARK, INC.

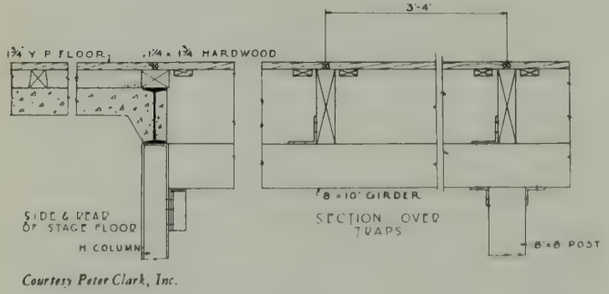




FRAMING of Three Elevators in Orchestra Pit Fox Theatre, Atlanta; JOHN EBERSON, Architect (See text at right)



ELEVATOR SHAFTS in Basement of Fox Theatre shown above (See text at right)



Courtesy Peter Clark, Inc.

TRAP DETAILS McCarter Theatre, Princeton University; FISHER, Architect. At the left is shown the floor construction at sides and rear where there are no traps; at the right, construction over traps.

Traps should be provided covering about three quarters of the area of the stage proper, and should extend on the sides at least to the lines of the proscenium opening. These traps are usually about 3′ 6″ x 6′ 0″.

The trap room should be open under the entire working part of the stage (the part on which the action takes place).

Elevators. Often, especially in large theatres, stage elevators (called *bridges*), are installed. These are sections of the stage which may be mechanically raised or lowered. In large movie houses an elevator is sometimes installed on which the screen and loud speaker equipment are built. This is lowered into the stage when not in use.

Elevators of a similar style may also be used to raise and lower the floor of the orchestra pit, the organ console, and the piano. These may be individual elevators or may be combined into two or one. The console elevator is sometimes constructed as a turntable.

Under the Stage. Musicians' room, with access to the orchestra pit, containing lockers and a toilet.

Orchestra Pit. The orchestra pit should be arranged so that the rail may be removed and temporary seats installed when desired.

5. STAGE LIGHTING. For the first time in the history of the theatre, scientific principles of illumination design are being employed on the stage, and lighting equipment based on accepted standards of efficiency and sound engineering practice is being substituted for obsolete methods long discarded in other fields of lighting.

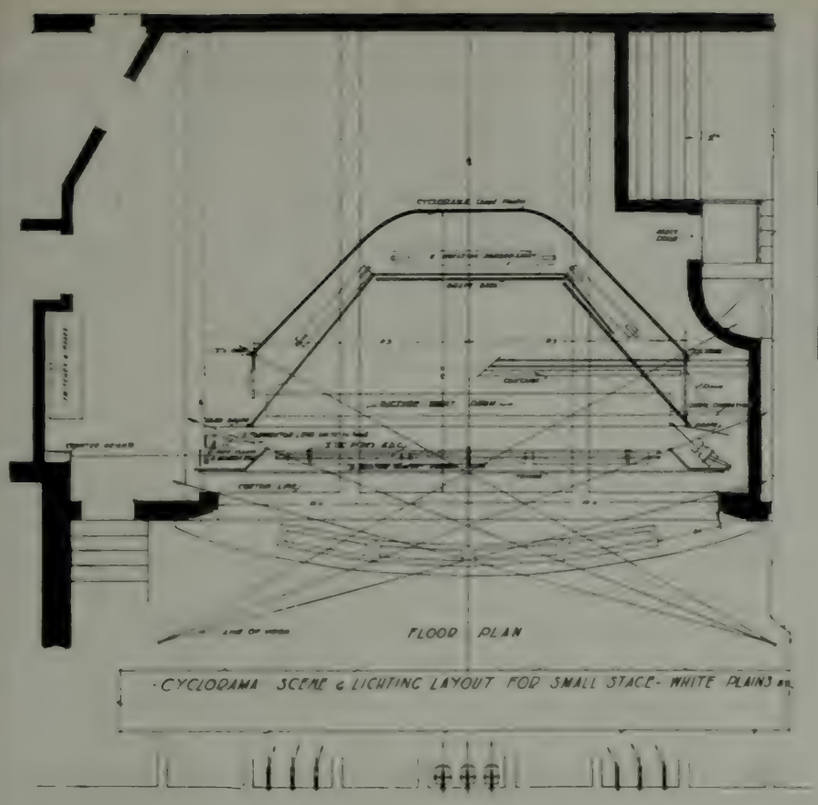
As many theatre stages and practically all high-school and college stages are not designed for proper lighting, it is not safe to base lighting provisions on existing jobs or some of the lighting equipment now on the market. The recommendations of electrical engineers, unless they have had considerable experience with actual lighting of plays *in the finished theatre*, should be carefully checked by someone thoroughly acquainted with stage lighting problems. On this point S. R. McCandless of Yale writes:

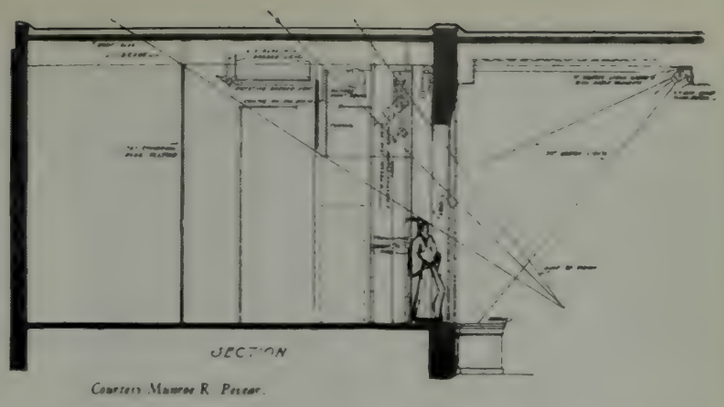
"Until the architect knows enough about lighting and the engineer knows more about architecture and theatrical production, some designer who knows the problems of both (a kind of theatrical lighting architect) should be employed in connection with every job. When you consider the amount of money that is being spent on decoration, on mechanical equipment and other elements which promote comfort and beauty, it seems strange that the architect should be willing to limit its effectiveness by an ignorant use of light.

"Another point I think you should make very definitely is that just as we are using more plumbing and sacrificing exterior to that end, tomorrow we will be using light much more extensively than we now think necessary. Unless provisions are made for this when the building is in the process of design, the poor conception of the architect will go limping through life always incomplete."

a. Principles Governing the Design of the Lighting Layout.

"The structure of the building must lend itself to putting different types of instruments in almost any position. These instruments





Note the APRON LIGHTS (in section at right) attached to the ceiling; note that FOOTLIGHTS (in plan at left) are kept 4 feet from sides of proscenium arch. The drawings are of small stage for amateur theatricals included in the WESTCHESTER COUNTY CENTER, White Plains, New York; WALKER AND GILLETTE, Architects

should be easily hung and well concealed from the audience so that the mechanics of lighting are not obvious.

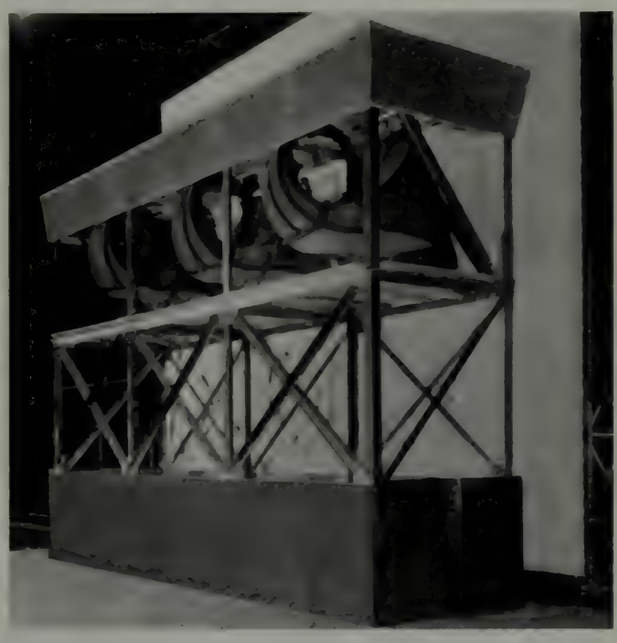
"Lighting equipment should be portable so as to be useful in a number of places. This necessitates standardized hangings and connections."[2]

Even footlights, cyclorama lights, etc., though designed for a definite use, might be portable, as the space they occupy may be needed for other purposes.

Outlets should be installed at convenient positions to serve a reasonable number of lighting units in many locations. These outlets should be regular plug pockets or 15 ampere female pockets* with a connector at the end of a short pigtail. These outlets should be grouped in fours where colors might be used. Provision must be made for installation of light bridges, pipe battens, stands, and portable bridges, on which to mount the various instruments. The instruments should be equipped with pipe clamps and swing joints to allow easy hanging in any position, and focusing in any direction.

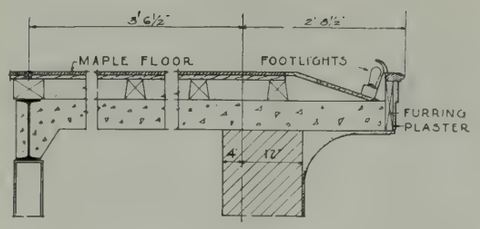
b. Location of Instruments for the Average Theatre. Stage lighting instruments are best classified by their location and use rather than by differences in the lamp or fixture. For example: footlights may be open lamps or groups of reflector units. A group of focusing lense units (popularly called spot-lights) may be called foot, border, teaser, tormenter or cyclorama lights, depending on the location. Technically any focusing lens manually *operated to follow a character around the stage* is called a spotlight.

Originally footlights were used to illuminate the actors; but with the introduction of various spot- and border-lights, the footlights have come to be used largely to lighten shadows and tone up the scenery. In presentation houses they are used extensively to light the

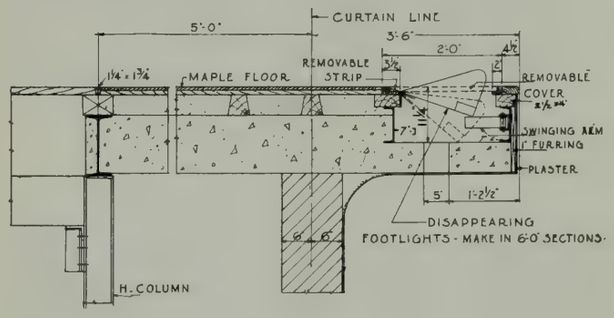


SOUND AMPLIFIERS, FOX Theatre, Atlanta; JOHN EBERSON, Architect. This installation must be directly behind the screen, or the acoustical effect is thrown off. This one has an elevator of its own

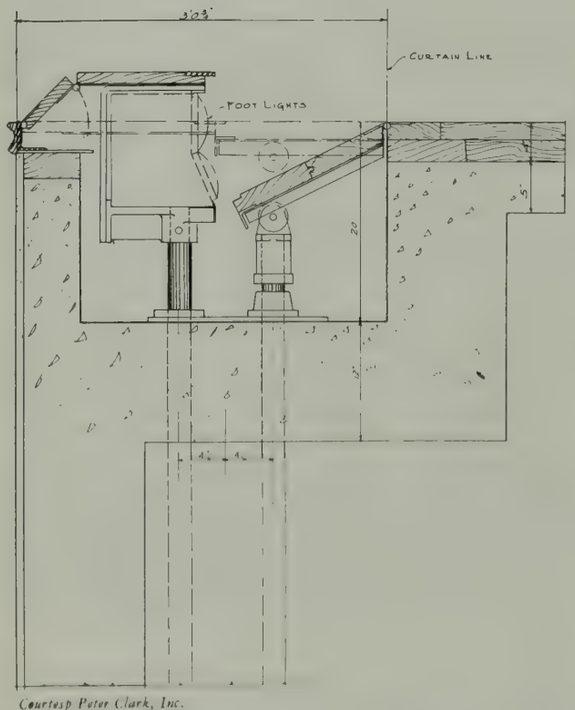
*Not always permitted by local code.



TYPICAL FOOTLIGHT DETAIL



Detail of DISAPPEARING FOOTLIGHT, McCarthy Theatre, Princeton University; FISHER, Architect



Courtesy Peter Clark, Inc.

DISAPPEARING FOOTLIGHT for Mastbaum Theatre, Philadelphia.

chorus girls. The illumination of the actor now comes largely from focusing lenses from the face of the balcony, or from projection booth, auditorium, ceiling, light bridge, or wings. The accompanying sketch shows how an actor is lit by different groups of lights as he progresses from backstage to front stage. The light must be even everywhere on the stage, and must nowhere cast unnatural shadows on the face. "Soft-edge" lenses focused from the ceiling of the auditorium at a 30-degree angle to the vertical are needed as the actor moves forward out of range from the teaser lights.

c. Footlights. For satisfactory performance, the footlights must fulfill the following requirements: (1) the filament of the lamp bulb should be above the stage floor level; (2) the top of the reflector should not project above the floor more than four and one-half inches; (3) the light rays from colored bulbs or light reflectors using color screens must overlap sufficiently to secure mixing of the colors close to the footlights in order to avoid a "Scotch plaid effect"; (4) the wattage used and spacing of bulbs or reflectors will depend on the size of theatre and size of stage; (5) the installation must be kept 5 feet or more from the sides of the proscenium opening, to prevent objectionable reflection from the proscenium wall; (6) footlights can be installed in three or more removable or disappearing sections; (7) they should be wired for three or four colors, and controlled in center and end sections; (8) the light should all fall within the proscenium opening.

The footlights are commonly arranged for three colors, each color separately controlled. These may be colored bulbs or clear bulbs with color screens, and may be arranged in single or double rows.

d. Light Bridge. Should be built approximately 6 feet shorter than the proscenium opening is wide, having two battens underneath and mounting pipes on the hand rail. Hung up-stage from act curtain. The bridge should have 12 to 24 outlets and 2 to 4 arc outlets.

e. Tormenters. Six to 12 outlets are desirable on each side of the stage with permanent ladder to permit adjustment.

f. Border Lights. Borders are generally 4 to 10 feet less in length than the width of the proscenium arch. They are spaced 6 to 8 feet apart, and good practice is to have one work light at each end of each border. One hundred to 125 watts of Type C lamps in each color are provided for each lineal foot or border.

First Border. Four feet shorter than the proscenium arch at each end and hung on a pipe batten hung from strain insulators. Fed by cable suspended from the grid.

Second and Third Borders. These are 2 feet longer than the proscenium arch, and supported the same as the first border. Fed by cable suspended from the grid.

Provision for Additional Borders. Four to 8 outlets on the grid, spaced so as to be accessible for lights to hang back of the third border.

g. Cyclorama Lights. Several high-power circuits to supply whatever type of cyclorama lighting is used. Fed by cable suspended from the grid. Also stage pockets properly located for illumination for the bottom of the cyclorama.

Floor Pockets. Four to 9 (four-outlet) floor pockets, spaced along the sides and rear of the acting area. Also two to four arc pockets on each side of the stage.

Balcony Rail. From 4 to 12 fifteen-ampere outlets.

Apron or Beam Lights. Provision should be made for from 4 to 12 beam lights in the ceiling of the auditorium. They should be at an angle of 30° with the intersection of the curtain and stage lines. Access to these beam lights may be had in the space between the hung ceiling and the roof or by portable ladders in small auditoriums.

Work Lights. Can be attached to any of the existing circuits or run independently for stage area, switchboard, pin rail and prompt board, orchestra lights.

h. Control Board. The control board in a rental theatre is a comparatively simple affair. It generally provides control only of auditorium lights, footlights and the first border lights. *A large company switch of 1000–2000 amperes is always provided* to serve the portable boards that each company brings with it.

In the professional theatre a special board is built for each production, and tapped into the main service as a control for practically all the lighting in that particular show.

In the producer-owner theatre (community, repertory, school, or movie) this portable board becomes part of the permanent equipment of the stage.

The following principles should be considered in designing a control board:

1. CENTRALIZATION OF CONTROL.

"The important consideration is that, so far as possible, each light unit on the stage shall be subject to central control from a vantage point from which the stage can be seen; that each unit shall be subject to separate control; that groups of like units, classed by location or color, shall be subject to group control, apart from other groups; and that the stage lights, as a whole, shall be controllable apart from the house lights.

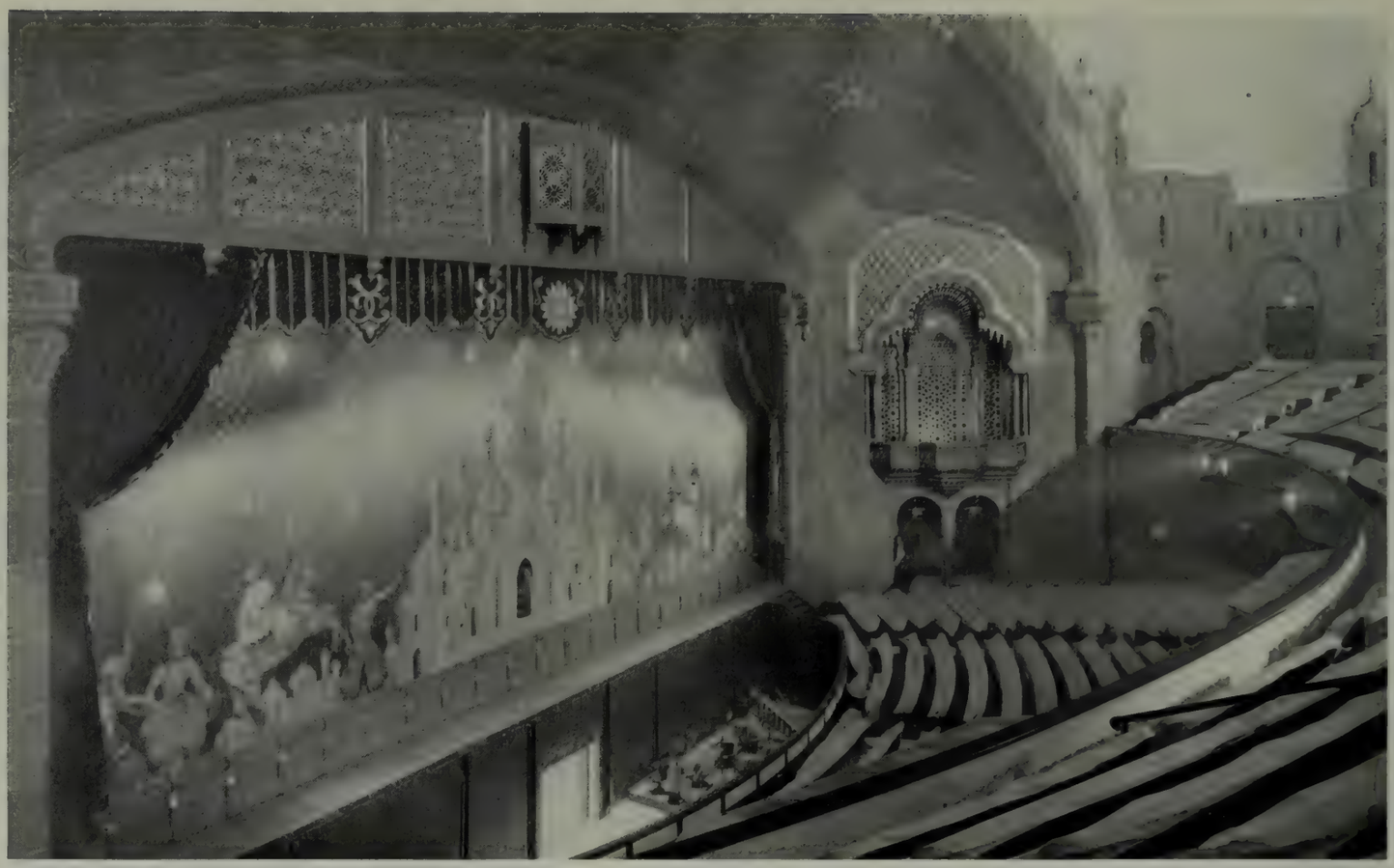
"That is, assuming, for purposes of illustration, the arrangement of lights common to most theatres, the white lights of the first border shall be controlled by a switch apart from that controlling the white lights of the second border or the third or the fourth. So, likewise, for each color circuit of each border, separately. There should be a white border main switch, controlling the white lights of all the borders, and a blue border main, etc. Above these, there should be a border main switch controlling all the border lights simultaneously. And thus with each division of the stage lights. Over all, one stage main switch should control all the lights of the stage. The auditorium lights, with their own switches, should be controlled from the same board as the stage lights.



LIGHT BRIDGES large and small. *Above* is the installation in the Temple of the Scottish Rite, Philadelphia; designed by PETER CLARK, INC.

Below is a little theatre installation at the University of North Carolina





Fox THEATRE, Atlanta; JOHN EBERSON, Architect. Showing balcony, orchestra seats and musicians' pit with elevator down, giving access to backstage door

"So far as possible, there should be a dimmer for each switch on the board, controlling each light unit separately. With 'master' levers related light units can be gauged and controlled simultaneously."[1]

The present board with all master controls within easy reach near the operator simplified the problem tremendously.

2. PHYSICAL EASE OF OPERATION.

"Compactness, to come within the easy reach of the operator and to allow for placing the board in such a position that the effects on the stage can be seen by him, is limited by the size of parts, by electrical spacing, dimmer spacing, interlocking and interconnecting apparatus. But the invention of remote control by contactor switches and pre-set devices on the dimmers allows considerable condensation. Single pole switches, multi-capacity dimmers, interlocking and interconnecting devices permit an elimination of many units.

"All parts under the control of the hand should be as frictionless as possible. Their size should be related and spaced with regard to *finger manipulation rather than for the hand*. Motor and remote control, which allow for the work to be done mechanically or electrically, have solved the problem somewhat.

Below: Three sets of BORDER LIGHTS with three curtains for successive playing depths of stage.



3. CLEARNESS AND SIMPLICITY.

"The unit (switch, pilot light, and dimmer) combinations with all parts directly related to one another and with adequate markings as to wattage, amperage, location, use, etc., make a very simple board to operate. Interconnecting, grouping and dialing of dimmers allow for massing color combinations. Pre-set dimmers and switches permit single movement master control."[2]

4. FLEXIBILITY. A thoroughly flexible board allows the interconnecting and grouping of light units of varying size in any position on the stage to any dimmer or group

of dimmers. It is less expensive, takes up less room, allows for a greater number of combinations, and is easier to operate than a board on which all the circuits are wired solidly to definite switches and dimmers. But such a board requires absolute accuracy in making a particular set-up.[1]

k. Dimmers. The outstanding item of expense in building a good control board is the cost of *dimmers*, the resistance devices by which the intensity of the light is controlled. They vary in capacity with their wattage and type. The dimmers, more than any other part of the control system, contribute to the range of lighting effects. In a modern theatre they are indispensable.

Signal System. "On account of the size of the ordinary theatre building and the necessity of dispatch in the performance, a prompt-board is necessary with communication to all parts of the stage, the dressing rooms and the building. Light signals (with a return flash to the switchboard, curtain pull, the pin rail, sound cue positions, and such other places as are important for time cues) should be mounted above the desk on which the stage manager has his script. Dressing room call signals, or a loud speaker, an act call bell which announces the beginning of an act, and an intercommunicating telephone to all parts of the building can be mounted alongside the flash signals. The prompt-board should be as close to the proscenium as possible or better under the front of the apron, as one finds in the continental theatre."

"The unconscious effect of the light in a scene can be destroyed if the audience senses the mechanics. Snap switches, noisy dimmers, squeaky interlocking devices, should be eliminated. Spring stops on the dimmer, and knife blade switches or contactors, well housed, help to accomplish this end."[2]

l. Projection Booth. The projection booth should be on a separate floor above the balcony. It must be of fireproof construction throughout. The floor must be substantially constructed to support the projection machines and to avoid vibration. The projection and observation ports must have tight fitting gravity shutters that close automatically in case of fire. The booth must be provided with adequate exit facilities for the operators in case of an emergency. All doors should be of the automatic self-closing type. Adequate ventilation is mandatory.

"It is essential that the port holes be of correct size and location. 'The architect should get his specifications from a firm dealing in projector equipment.' Four types of ports should be provided: observation, projector, stereopticon and spotlight. Observation ports for operators are usually about 15 inches square with the center of the opening 5 feet above the floor. Projector ports are 12 inches square, and the stereopticon port about 8 inches wide by 15 inches high. The centers of these openings should be approximately 4 feet above the floor of the projection room. The exact height of all openings in the front of the booth depends upon the angle of projection [see page 467] and the layout should be carefully studied. The spotlight requires a port at least 18 inches high and 24 inches wide. Its centre is located about 4 feet 6 inches above the floor. In a horizontal direction projector ports are located about 4 feet on center. Since the machines used in the projection room are standardized as to size, the incorrect location of the ports produces unsatisfactory results and a condition difficult to correct."[3]

Ordinarily a booth requires ports for at least one spot light, one stereopticon, 3 motion picture machines, and



From "Footlights Across America."

COLLEGE PLAYERS start a good deal going. They perform at improvised theatres in the country. (Cornell University Players at the Syracuse State Fair, N. Y.)—



THEY CARRY good drama where very little went before. (Carolina Playmakers on tour)—



THEY EXPERIMENT with any materials at hand. (A play with "Constructivist" setting at Vassar) Their activities result in the building of many "little" theatres, where big commercial ones would not go.

METHOD OF ANALYZING A FINANCIAL SET-UP

Job No. Location New York City

Land Costs
- Fee Ownership
- Brokerage commission
- Cost of possession
- Carrying charges if any from date of purchase to date of commencement of demolition

Total Land Cost

Construction Costs
- Theatre—(figure on fine const. 55c cu. ft.)
- Commercial—(figure on fine const. 65c cu. ft.)
- Architects fee 5% on above
- Furnishing & Equipment

Total Cost of Const.

Financing Costs
- Financing bond issue—cost 10 pts.
- 1 pt. expenses
- Carrying charges—12–18 months
- Taxes during construction
- Interest at 6% (less 4% interest on deposited monies)
- Rent (if part leasehold)

Total Financing Cost

Total Land, Bldg. and Financing Costs
- Bond issue
- Cash Equity (25%)

Theatre Overhead
- Mortgage Interest 6%
- Amortization 3% on bond
- 6% on cash invested
- Taxes
- Insurance
- Rent (if part leasehold)

Total Theatre Overhead

Commercial Income
- Stores
- Offices

Total Commercial Income
- Operating Costs (runs from 60c to $1.00 depending on type of building)
- Management Fee
- 10%—15% vacancies on offices only (depending upon renting conditions of town)

Deduct Total Commercial Expenses

Net Commercial Income

Theatre Overhead

Net Commercial Income

(Seats in House)

House Scale times

% attendance per day times

Number days per year equal

Total income from theatre

Production Costs

Income from Theatre*

Profit (Income from theatre less overhead)

This will determine whether project is a good investment. If not a good investment the whole set-up is revised, plan altered, a less expensive construction used, or a less expensive land selected or project abandoned.

* (Estimated by theatre manager or owner from architect's sketch considering location and production costs.)

3 for observation. Where the equipment consists of 3 spot lights, a stereopticon, and 3 projectors, a room at least 12 feet by 30 feet is required. Ample working space is essential to the operation of the machines by the operators, who must often work quickly and unhampered.

Adjacent to the projector room there should be provided a work room (for rewinding) about 6 by 7 feet, which should contain a substantial work bench and a fireproof cabinet for reels. There should also be a rheostat room about 6 by 11 feet and a battery room about 5′ x 7′ 6″ which is necessary for sound pictures. A small room should adjoin the projection room for motor generator set if direct current is not available and must be transformed from alternating current. Wash room and toilet facilities should also be provided for attendants. Motor generators are best located in basement in that way eliminating noise and vibration.

ECONOMICS

The importance of the architect's knowing something of the economics of theatre design is apparent when one examines the methods generally followed in promoting a theatre project. For example: from the accompanying method of analyzing the financial set-up, as used by one of the leading theatre owners of the country, it will be noted that the decision as to whether the cost is in proper relation to the site and probable income *is not made until after* the architect has prepared his *preliminary plans*. If the architect in cooperation with the owner makes a preliminary financial analysis before preparing plans, much waste of time will be avoided.

Generally speaking, the theatre building and land may cost twice as much per seat as total gross income per seat per year. But there are so many variables in a theatre project that each case requires its particular analysis and solution. A scheme found to be a good investment in one locality may be a losing one in another. However, analyzing the problem as shown, and estimating the project, on the basis of the box office returns (determined by what the traffic will bear), the architect can then intelligently sketch out his preliminary plans, and the owner may determine from these whether the investment will be profitable.

From a study of several community theatres it is apparent that the total yearly income received will not exceed approximately one-half (average attendance compared to total capacity) the house scale for approximately 275 performances. If the house scale averages a dollar per seat the gross yearly income received will be ½ x $1.00 x 275 equals $137.50 a year per seat. From analysis of production and operating costs it is apparent that the cost of the theatre project may be approximately two times the gross yearly income, or in this case the cost including land may be $275 per seat. (This particular community theatre cost $370 per seat; the difference is made up by subsidy.)

From an analysis of several neighborhood movie theatres it is apparent that the gross yearly income

received is generally not over 1½ times the house scale. Therefore, if the seat price of a neighborhood theatre were thirty cents, the gross yearly income received would be 1½ x $.30 x 365 or $164.25. The total cost of land and building should not exceed 2 x $164.25 or $328 per seat.

For a movie in the heart of the city a seat will be occupied on an average of two times a day. If the average seat price is seventy-five cents the total gross of the seat will be 2 x $.75 x 365 — $547 and the cost of the theatre per seat for land and building approximates twice this sum or $1,095.

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SPECIFICATION CHECKING LIST

The Theatre Specification and Checking List on the next page, by A. D. Hill of Hodgens and Hill, Architects, was received after the index had been printed, and so will not be found in the Table of Contents. It nevertheless is an important part of the study, and will repay careful perusal.

IMPORTANT NOTICE

The *Auditorium Requirements in the Theatre* are to be treated in a special, separate "Technical News" study in July issue of the ARCHITECTURAL RECORD. There have been extensive innovations in acoustics and lighting too important to be summarized briefly in a general study such as this; particularly interesting are the several experiments in "painting with light."

THEATRE NEIGHBORHOOD HOUSE—"A"

1350 Seats—average price of ticket $.30

	Cost	
	Total	*Per Seat*
Land	$ 90,000	$ 66.6
Building	130,000	96.3
Equipment		
Electric Sign	3,000	2.22
Decorations	3,000	2.22
Booth Equipment	6,000	4.44
Carpets and Draperies	4,000	2.96
Pipe Organs	12,000	8.88
Seats	10,700	7.93
Light Fixtures	1,500	1.11
Vitaphone	13,000	9.63
Total	$273,200	$202.3

THEATRE NEIGHBORHOOD HOUSE—"B"

3250 Seats—average price of ticket $.50

	Cost	
	Total	*Per Seat*
Land	$200,000	$ 61.50
Building and Architect	600,000	185.00
Equipment		
Lighting Fixtures	6,000	1.85
Stage Equipment	26,000	8.00
Decorations	15,000	4.62
Asbestos Curtain	3,000	.92
Booth Equipment	25,000	7.75
Electric Signs	10,000	3.08
Draperies	5,000	1.54
Furniture	10,000	3.08
Pictures	2,000	0.62
Vacuum Cleaner	1,000	0.31
Carpets	13,000	4.00
Stage Sets and Proscenium Curtain	9,500	3.00
Seats	35,000	10.77
Total	$962,500	$296.04

THEATRE "C" IN A CITY OF 20,000

780 Seats—average price of ticket $.30

	Cost	
	Total	*Per Seat*
Land	$ 30,000	$ 38.40
Building	58,300	74.75
Equipment		
Organ	18,000	23.00
Seats	5,500	7.05
Electric Signs	1,500	1.95
Carpets	2,500	3.20
Draperies	1,000	1.30
Booth and Vitaphone	15,000	19.40
Decorations	1,900	2.40
Total	$133,700	$171.45

THEATRE CHECKING LIST

PREPARED BY A. D. HILL, THEATRE ARCHITECT

I. ENTRANCE

A. Ticket Booth

1. Ticket Vending Machine
2. Change Maker
3. Ceiling Ventilator
4. Electric Heater
5. Money Drawer
6. Brass Speaking Hole and Shutter in Glass
7. Shutter Over Lower Hole in Glass Above Vending Machine.

B. Vestibule and Lobby

1. Display Frames
2. Photo Frames
3. Photo Frames in Door Panels
4. Exit Signs over Doors
5. Sand Jars for Cigarette Butts
6. Sockets and Standards for Brass Rails
7. Plush Covered Chains and Hooks
8. Ticket Chopper
9. Electric Outlet for Same
10. Cove Lighting
11. Chandeliers
12. Sinkage for Rubber Mats

II. STANDING SPACE

1. Capping on Rail
2. Glass Wind Screen
3. Recessed Radiators
4. Drinking Fountains
5. Cup Receptacles
6. Rubber Mat
7. Sinkage for Carpet and Carpet Strips
8. Marble Base on Standing Rail

III. STAIRCASES

1. Materials
2. Rails Both Sides
3. Closet for Electrical Panel
4. Electric Signs for Coming Attractions
5. Electric Signs over Doors
6. Empty Conduits to Flasher Room from Signs

IV. AUDITORIUM

1. Width of Aisles
2. Elevations
3. Step Lights and
4. Chair Lights
5. Exit Doors to Open Clear of Passageway
6. Orchestra Rail and Steps
7. Electric Outlets for Musicians
8. Empty Conduits for Organ Wiring
9. Galv. Iron Pipes from Organ to Blower, Console and Relay
10. Obtain Size from Organ Contractor
11. Stud Frame for Shutters in Organ Chamber, Blower Room and Air Inlet
12. Organ Heater
13. Telephone Pay Station
14. Elevators and Machinery Room
15. Angle Irons on Edge of Light Coves for Ladders
16. Method of Relamping all Cove Lighting
17. Walkways Over Ceiling and Access
18. Electric Lights Clear of Fresh Air System
19. Electric Lights in Courts
20. Materials of All Floors, Walls and Ceilings
21. Hose Reel Recesses, Standpipes, Sprinkler Tank and System for Stage

V. BALCONY

1. Material for Capping on Rails
2. Bronze Rails on Balcony Front
3. Pipe Rails on Crossovers and Flights of Steps
4. Extra Steps from Crossover to Rows Above and Below
5. Spot Lights in Front of Balcony
6. Step Lights
7. Chair Lights
8. Exit Signs over Doors
9. Drinking Fountain
10. Telephone Pay Station
10. Material of All Floors

VI. MANAGEMENT REQUIREMENTS

1. Stationery Storage Space
2. Poster Storage Space
3. Ushers' Rooms
4. Lockers for Ushers
5. Captain's Room
6. Slop Sink and Janitor's Room
7. Refrigerator System for Drinking Water
8. Flasher Room for Electric Signs
9. Storage Space for Electric Sign Letters

VII. BASEMENT

1. Boiler Room
2. Coal and Oil Storage
3. Refrigerating Plant
4. Transformer Room
5. Contactor Room
6. Motor Generator
7. Meter Room
8. Battery Room for Emergency Light
9. Musicians' Room
10. Music Room
11. Storage Room
12. Workshop
13. Lavatories
14. Sumps
15. Pumps
16. Incinerator
17. Coal Chute
18. Pipe Trench Covers
19. Wheel Guards
20. Childrens' Playroom and Lavatories
21. Prism Lights
22. Steel Stock

VIII. ROOF

1. Flagpole
2. Tin Clad Doors
3. Kalamein Doors
4. Hollow Metal Windows
5. Pipe Railing for Fire Towers
6. Roof Over Fire Escapes
7. Downspouts and Drains

IX. STAGE

1. Scenery Door
2. Vestibule for Entrance
3. Wood Floor on Stage
4. Movable Portion
5. Loose Beams
6. Smoke Pockets for Curtain
7. Footlight Trough
8. Radiation Rear Wall and Skylight
9. Trunks and Baggage to Dressing Rooms
10. Drinking Fountain
11. Shower
12. Steel for Headblocks
13. Ladders to Grid Access to Roof
14. Skylight and Screen Under Skylight
15. Console Elevator
16. Orchestra Elevator
17. Elevator to Dressing Rooms
18. Borders Strips
19. Stage Pockets
20. Exit Lights
21. Angle Iron Frames
22. Subway Grilles
23. Fire Escape and Roof
24. Roof Ventilators
25. Louvres Over Air Intakes
26. Suspended Ceilings and Light Coves

X. MACHINE ROOM

1. Battery Room
2. Store
3. Music Room
4. Rewind Shelves and Cabinets
5. Air Inlets
6. Fans
7. Hoods Over Machines
8. Rubber Floor
9. Tin Clad Doors or Kalamein





kino
kino



Three views of the EMELKA-PALAST Moving Picture Theatre, Hamburg, Germany; KARL SCHNEIDER, Architect

The first shows the Street Front, the second the Auditorium, and the third the Lobby with the Ticket Booth

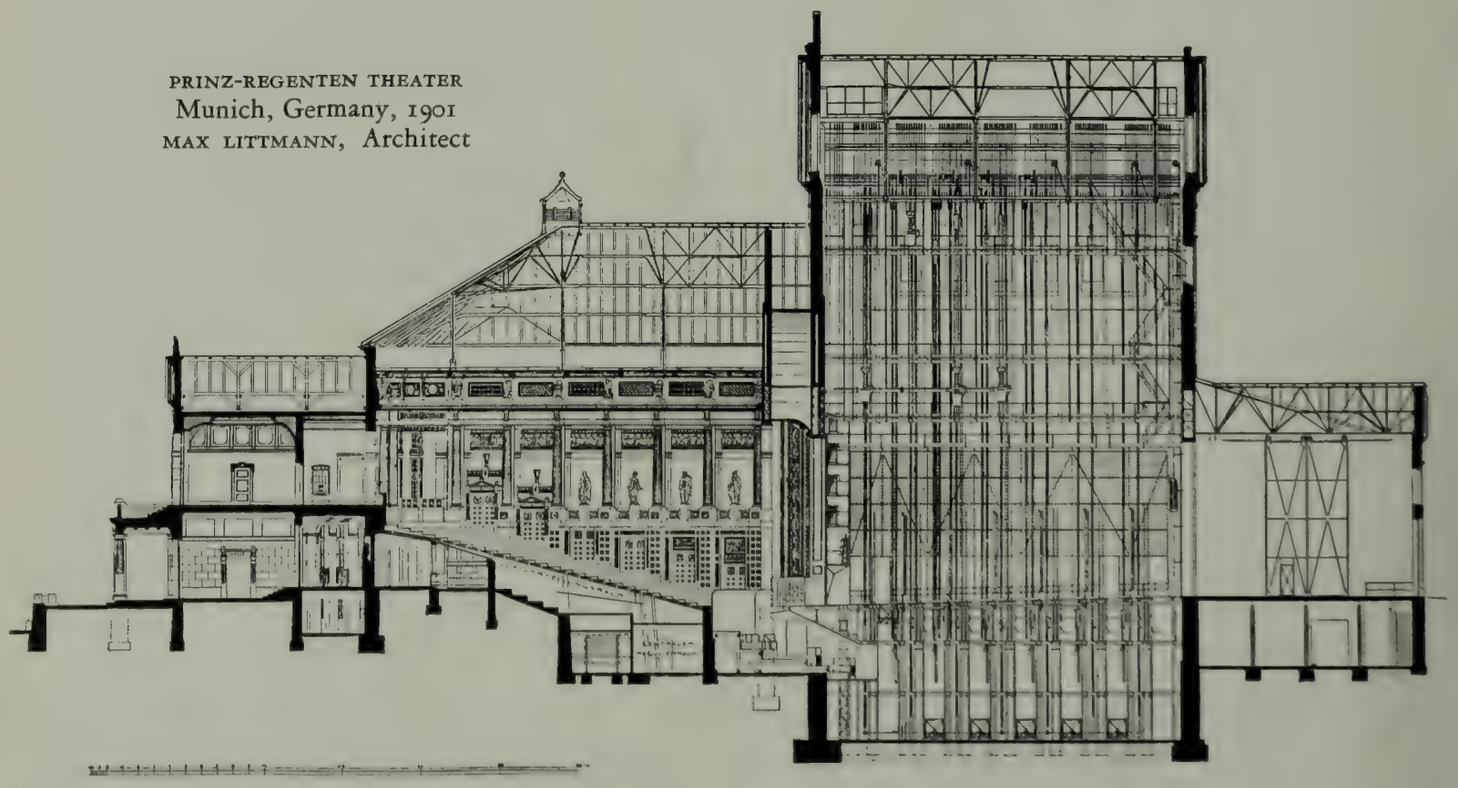
NEW THEATRE ARCHITECTURE IN EUROPE

BY K. LÖNBERG-HOLM

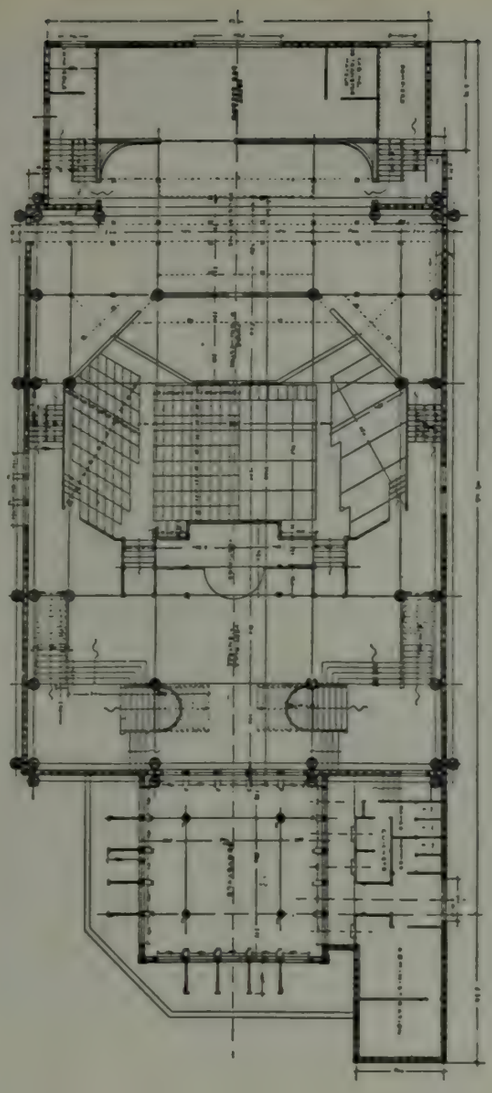
The main function of the theatre plan is the direct transmission of the visual, phonetic and spatial reality of the stage action to the spectator. It is therefore a reasonable demand that the three dimensions of the stage should be equally apprehensible from all parts of the auditorium.

The conventional theatre with its box stage, floor, and balconies, does not permit this necessary precise spatial apprehension of the stage. The sightlines that determine the layout are sightlines from the spectator to the stage opening. To the spectators on the floor, the stage is all ceiling and the stage action becomes a two-dimensional picture projected on the background of the stage. The actors are forced out to the footlights. To the spectators in the balconies the stage is distorted. To the spectators along sides of the auditorium part of the stage is cut off. This stage is satisfactory only for the movie theatre with its two-dimensional screen action; and it is significant that next to the movie theatre, the sports arena (and the cabaret) that offers a spatial reality, today has become the popular showplace.

The rejuvenation of the theatre is not a problem of increasing the mechanical efficiency of the present box stage. Only the placing of the theatre and the drama in a clearly defined functional relation to the community, and a clear understanding of the structural elements of stage action, will lead to a more satisfactory relation between actor and spectator and hence to a new theatre plan.



PRINZ-REGENTEN THEATER
Munich, Germany, 1901
MAX LITTMANN, Architect





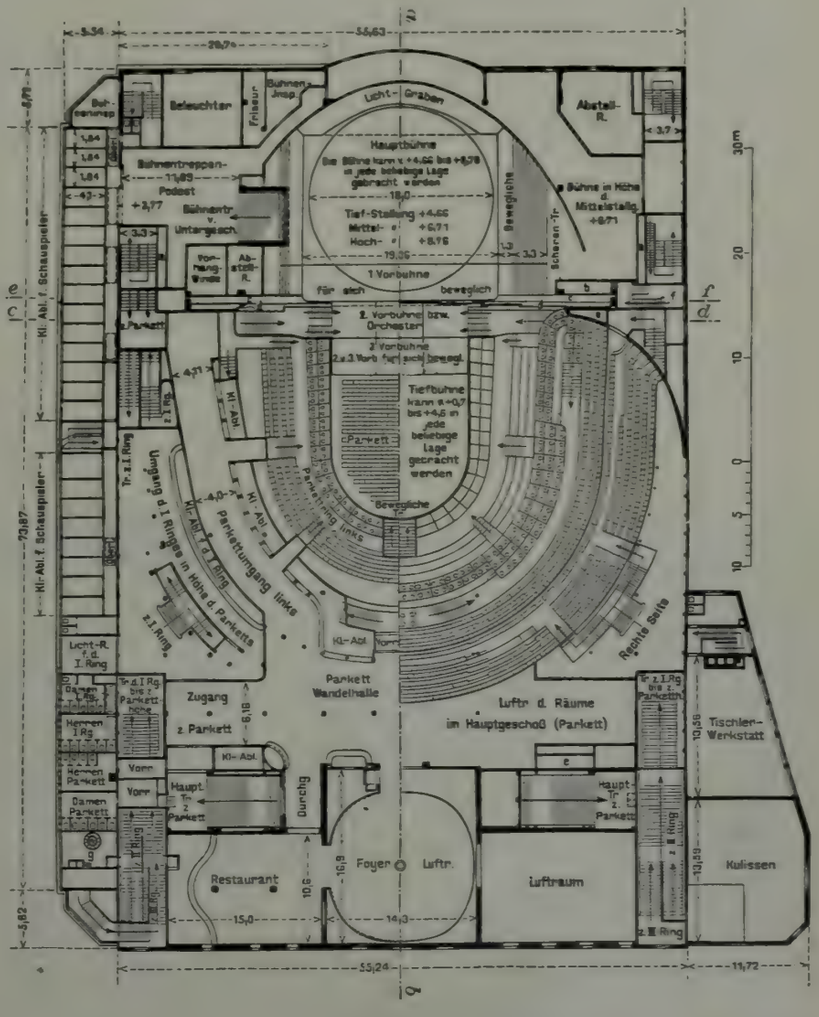
THEATRE in the Paris Exposition, 1925
A. AND G. PERRET, Architects

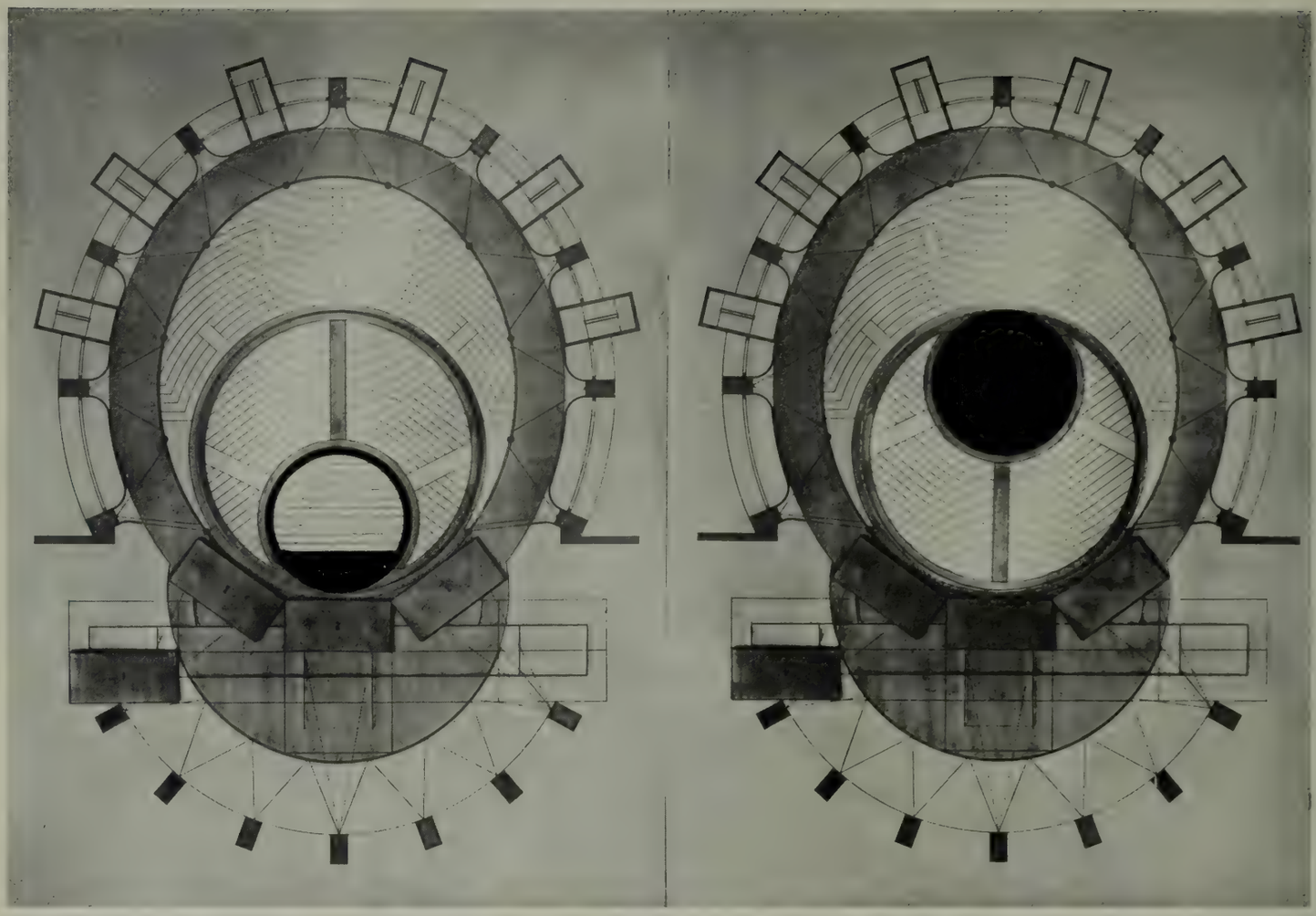
The stage in three wings commences to encircle the auditorium. This plan and that below by the German architect Poelzig were doubtless developments of Van de Velde's Werkbundtheater at Cologne in 1914.



GROSSES SCHAUSPIELHAUS, Berlin, 1919
HANS POELZIG, Architect

The stage breaks into the auditorium. In front of the main revolving stage are three proscenium platforms. The orchestra floor can be cleared of seats and included in the stage. Variable space relations between stage and auditorium are possible by raising and lowering the different stage sections.



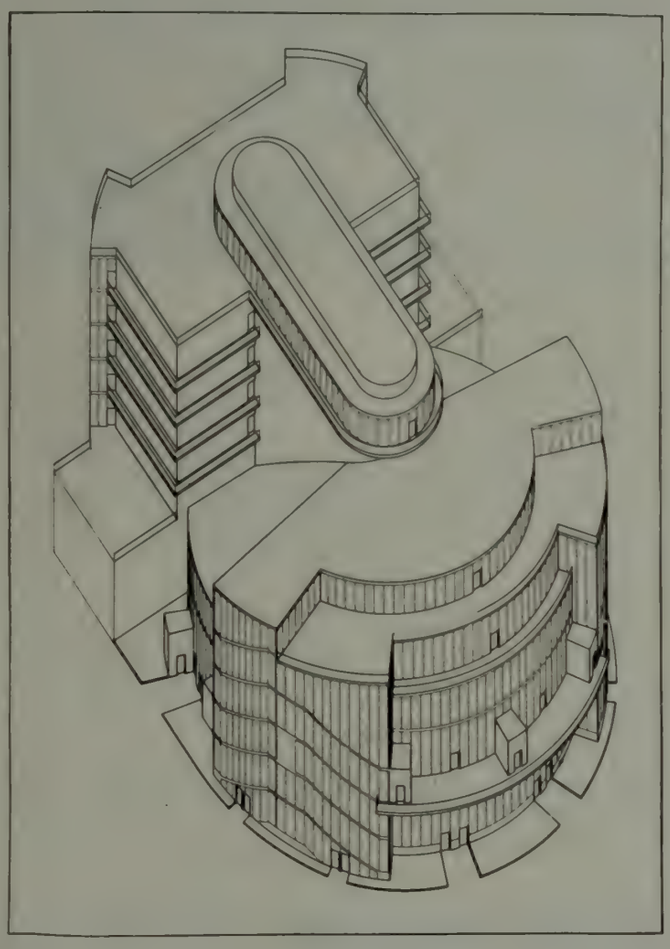


THE "TOTALTHEATER," PROPOSED BY WALTER GROPIUS, ARCHITECT (1927)

This arrangement of a revolving floor permits the same theatre to be used in three ways: circus, amphitheatre, or conventional box stage.

In the plan at the left above, all the spectators face a conventional box stage (with three rectangular wings). What the auditorium looks like may be judged from the skeleton model shown at the top of the opposite page. In the right-hand plan, the floor has been so revolved that an additional round playing space is gained in the center, that can be used either separately or in conjunction with the regular stage. The diagrammatic plans and sections on page 494 show how this is done, and give further details.

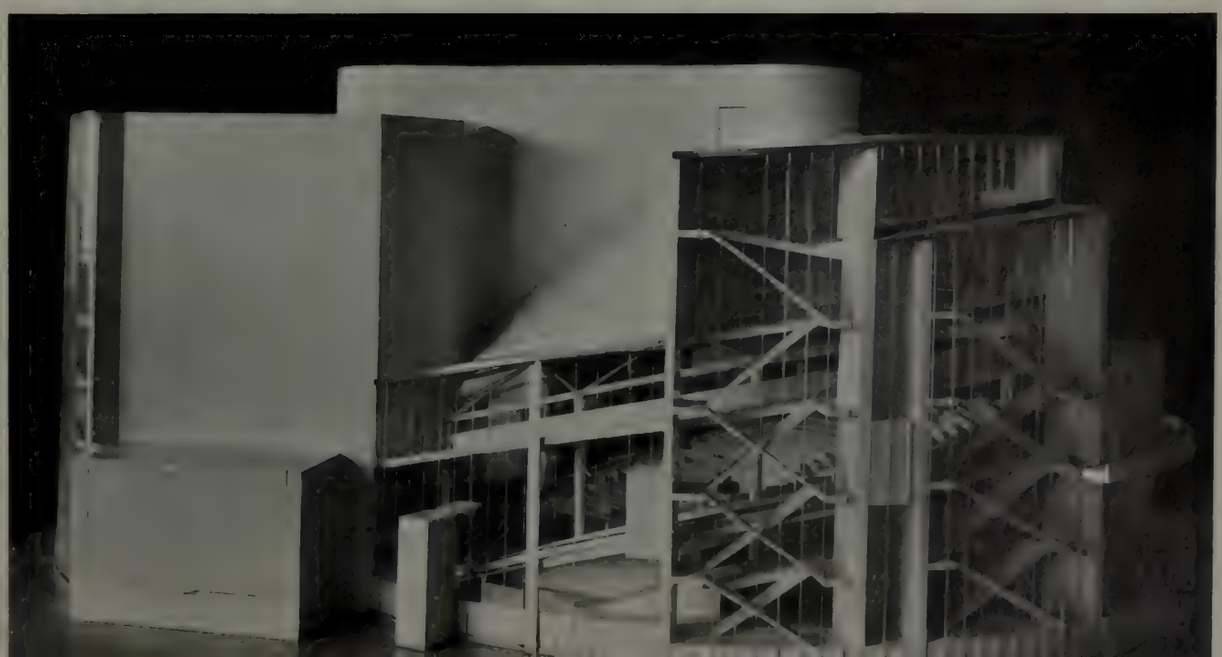
THE "TOTALTHEATER" proposed by
WALTER GROPIUS, Architect



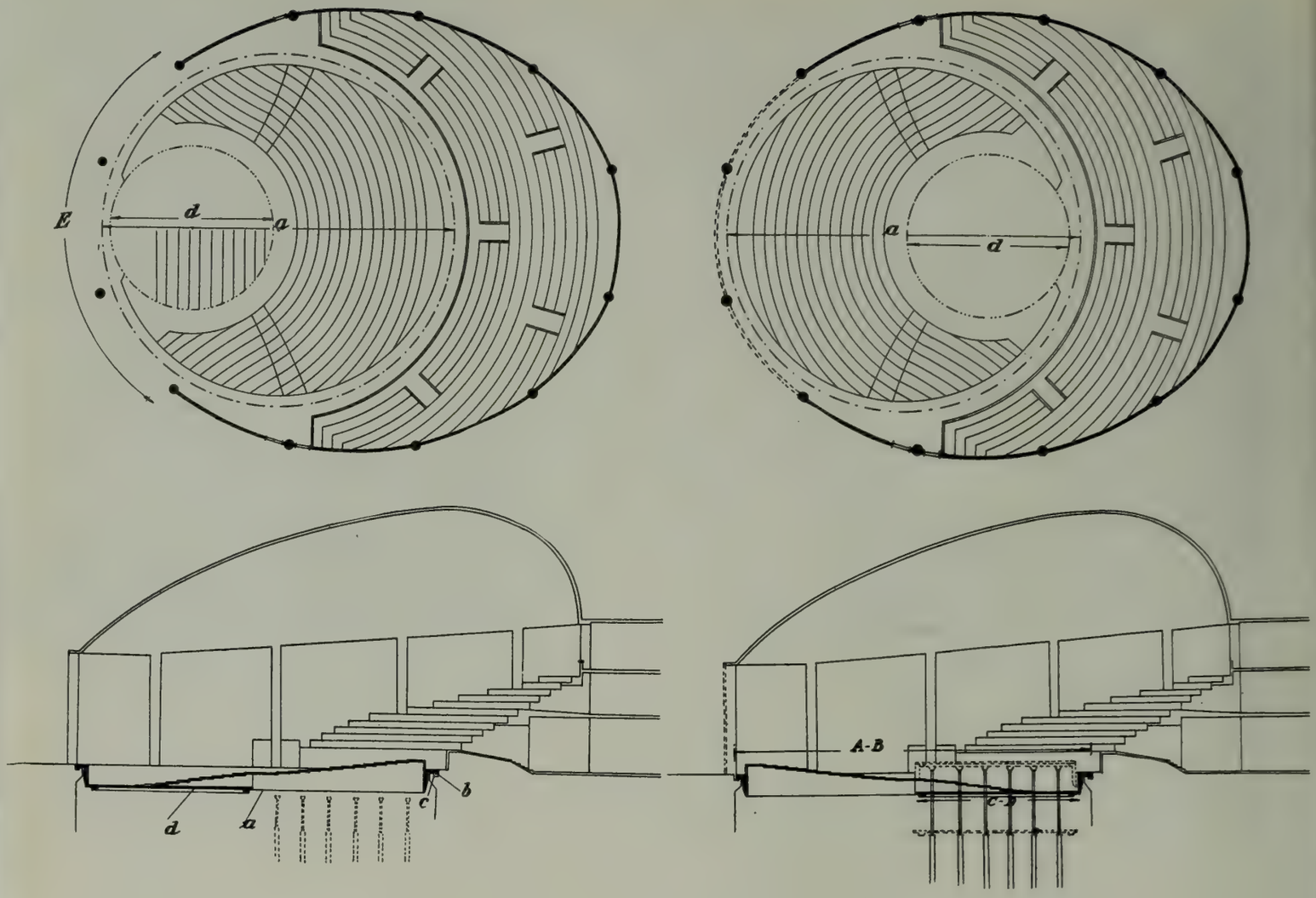


MODEL with part of ceiling cut out
to show construction

DRAWING from auditorium side



MODEL

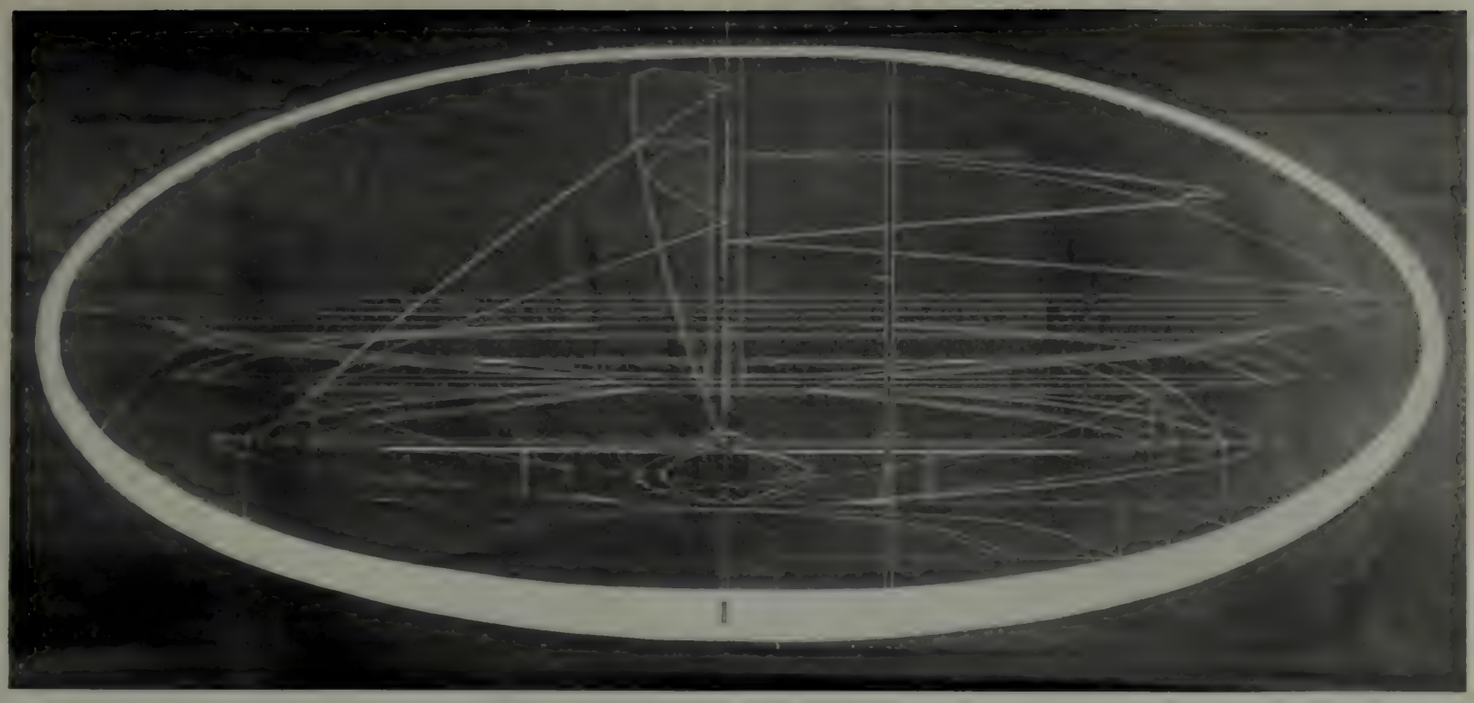


THE "TOTALTHEATER," PROPOSED BY WALTER GROPIUS, ARCHITECT

(See the previous two pages for plans, and for pictures of the model)

The enclosing oval shell is carried on twelve columns. The box stage (E) a triple stage similar to van de Velde's and Perret's, is at one end of the oval, placed within three column intervals partly embracing the proscenium. The stage settings are changed by means of horizontal conveyors. A track extending from the ends of the stage round the theatre and following the slope of the floor makes it possible to extend the stage action around the audience. The small circular proscenium (d) can be lowered, the seats removed, and the platform included in the stage. The actors can enter from the backstage or from the center aisle. A complete change takes place when the circular proscenium floor (a) is turned 180°. This change can be made during the performance. The small circular stage (d) is then located in the center of the theatre. The actors can enter from the aisles, from stairs below the stage, and from ladders suspended from above (vertical approach).

Provisions are made for extensive use of static or moving screen pictures and light effects to support the stage action. Screens between the columns, on the walls and ceiling and the stage background, serve as projection surfaces for light and movie projectors placed outside the columns in a projection room suspended from the ceiling. The spectator is placed in the center of the action. The theatre becomes a flexible space-machine that easily can be changed to meet the varying demands of the stage directors. The audience becomes not only a witness but an active factor in the show.

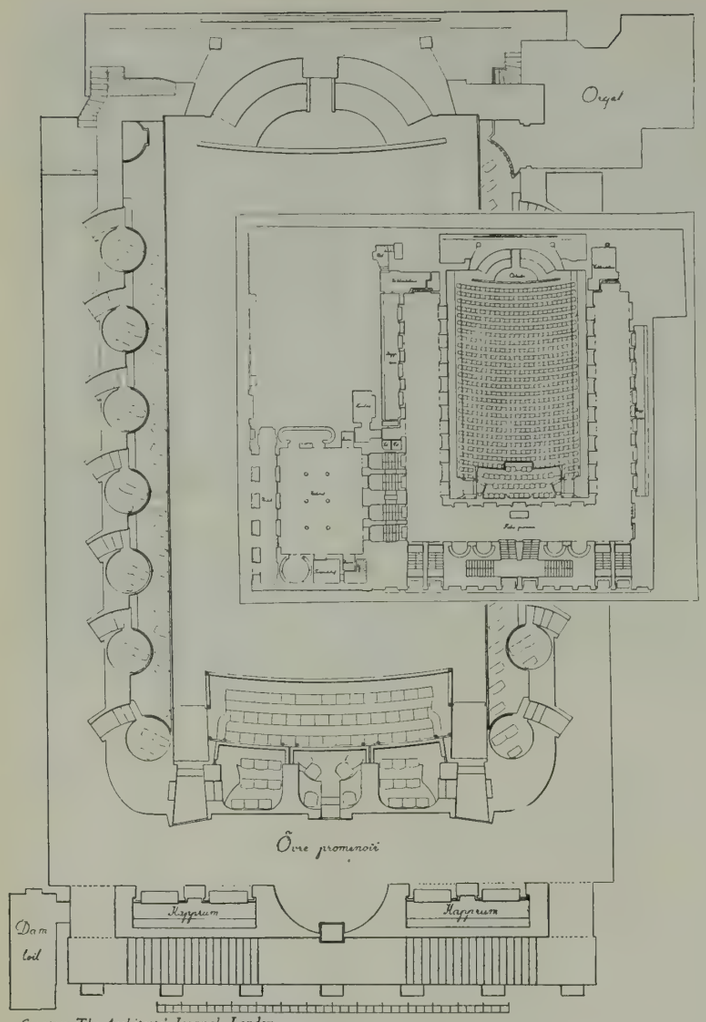


PROJECT FOR A "SPACE-THEATRE" SEATING 100,000 PEOPLE

FREDERICK KIESLER, ARCHITECT (1916–1924)

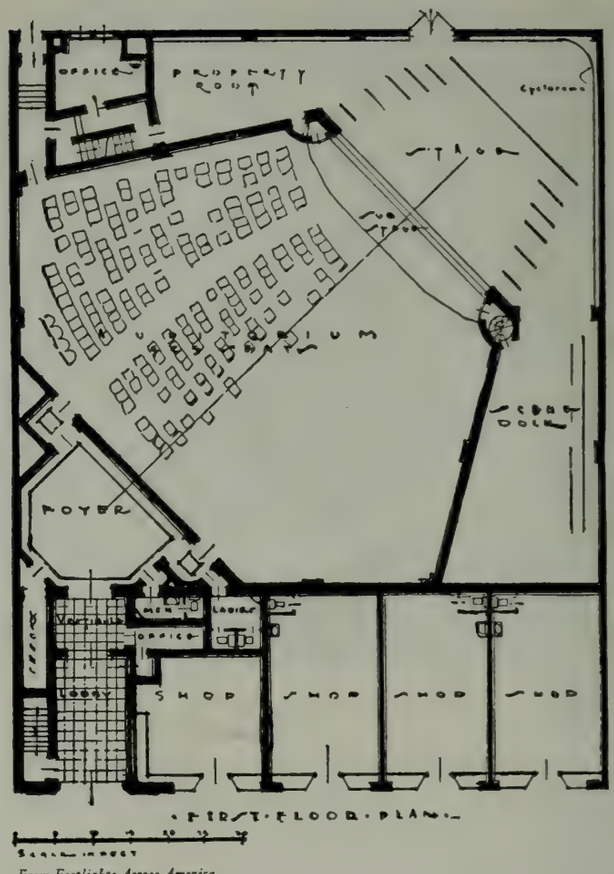
The whole structure is encased in double shells of steel and opaque welded glass. The stage (shown white on the plan) an endless spiral. The various levels are connected with elevators and platforms. Seating platforms, stage and elevator platforms are suspended and spanned above each other and next to each other in space. The structure is an elastic building system of cables and platforms developed from bridge building. The drama can expand and develop freely in space mounted on the spiral. (In the section at the top, only the right half corresponds to the plan below.)





Courtesy The Architects' Journal, London

The SKANDIA, Stockholm, a moving picture Theatre with an unusually fine arrangement of boxes

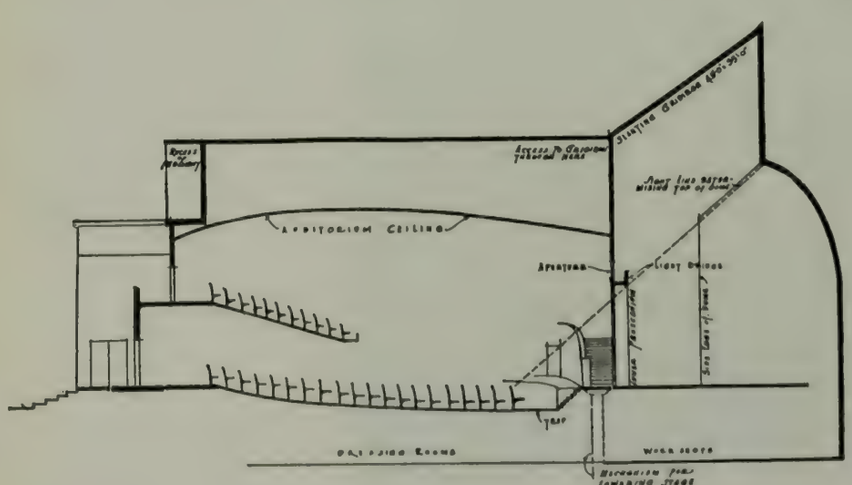


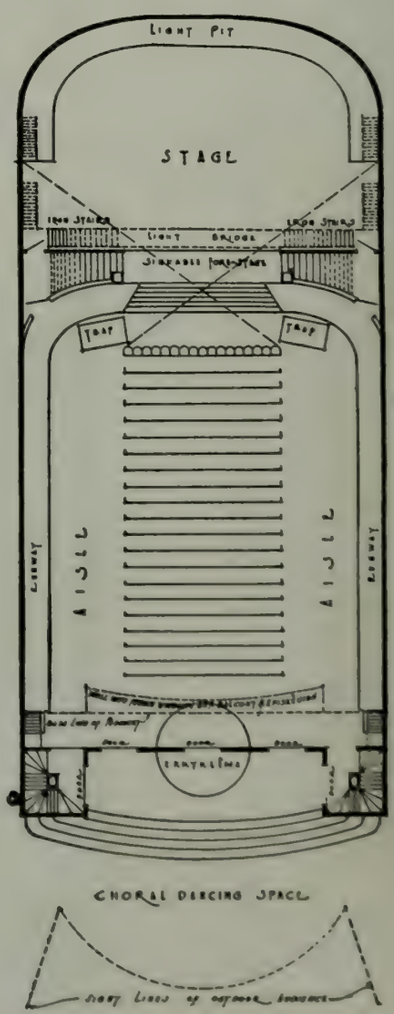
From Footlights Across America

The projected PLAYHOUSE of the Seattle Repertory Theatre

Below and Right: SAMUEL A. ELIOT, JR.'s, project for an ideal experimental playhouse, partially realized at Smith College. An outdoor Greek theatre is shown at the bottom of the plan

Theatre Arts Monthly





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Associate Architect
Henry Bailey Alden, *Boston, Mass.*
Contractors
Geo. A. Fuller Company, *Boston, Mass.*
RUSSWIN Dealer
Chandler & Barber Company, *Boston, Mass.*



HOTEL MANGER
Architects
Funk & Wilcox, *Boston, Mass.*
Consulting Architects
Geo. B. Post & Sons, *New York City*
Contractors
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RUSSWIN Dealer
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HOME HUNTERS IN SEATTLE FIND

KOHLER QUALITY IN THE NEWEST BATHROOMS

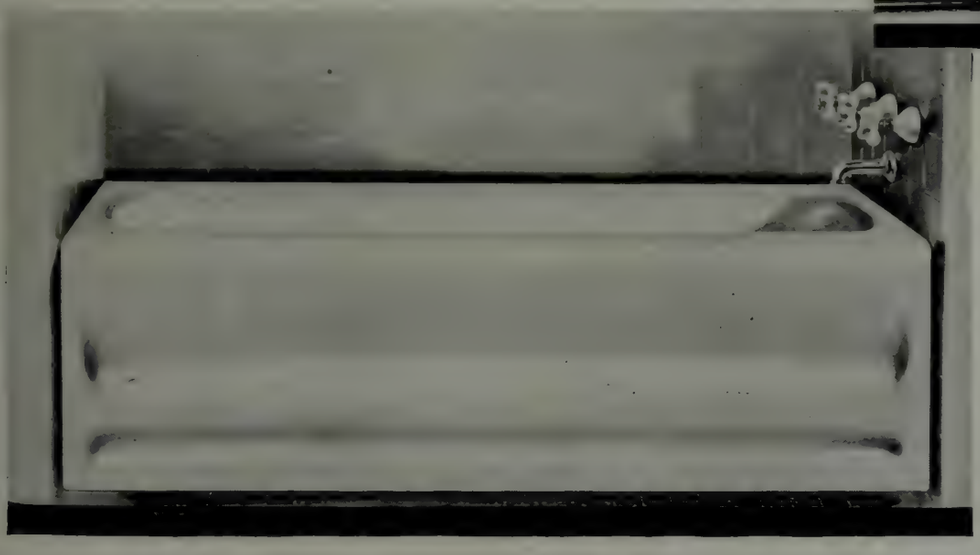
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- PARK VISTA Apartments, Seattle, Wash. . . . *General contractor, A. S. Hainsworth. Plumbing contractor, Chisholm Plumbing & Heating Co. Wholesalers, Palmer Supply Co.*
- VICEROY Built-in Bath, K-30-BG, *used in both buildings shown. One piece, slope end, recess pattern, all-over enameled. Built-in over rim supply and secret drain fittings with 1-2 inch compression valves. A popular all-Kohler installation.*

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FORESTBLEND face brick gives the architect two things which are of prime importance in securing unusual brick effects. These are color and texture. Given the infinite variety of color available in Forestblends together with their unique texture, the architect can create, through the use of varying bonds and mortar joints, extraordinary decorative effects.



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See our Catalog in Sweets
pages A-406-410

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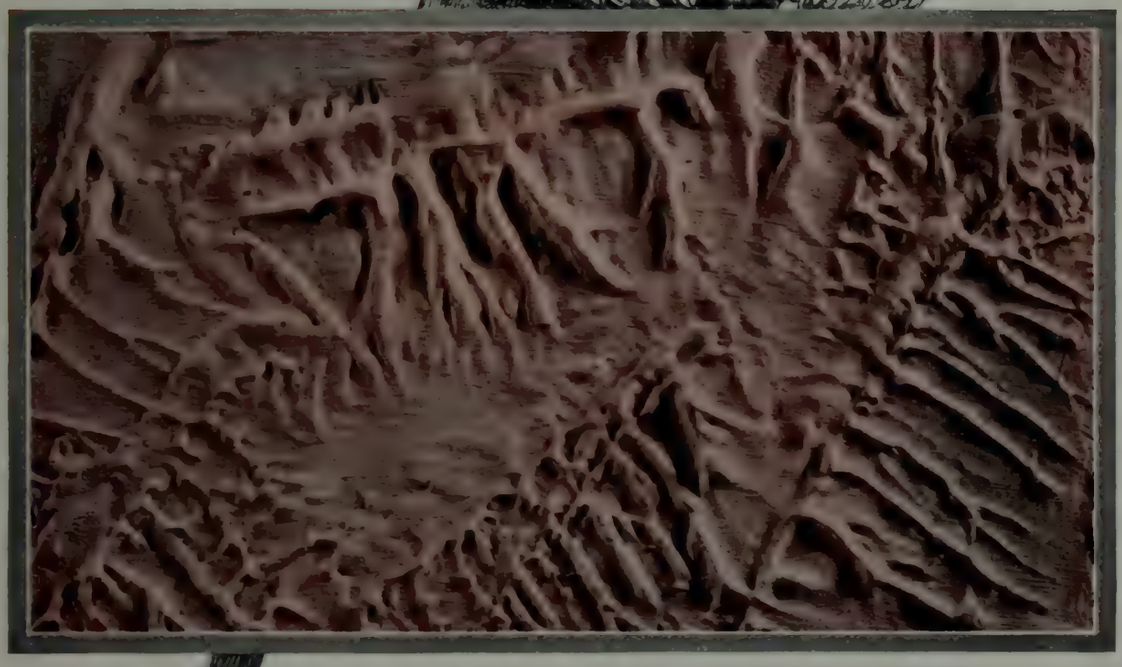
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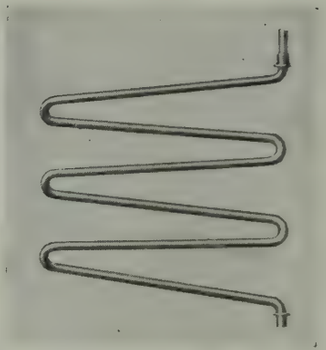
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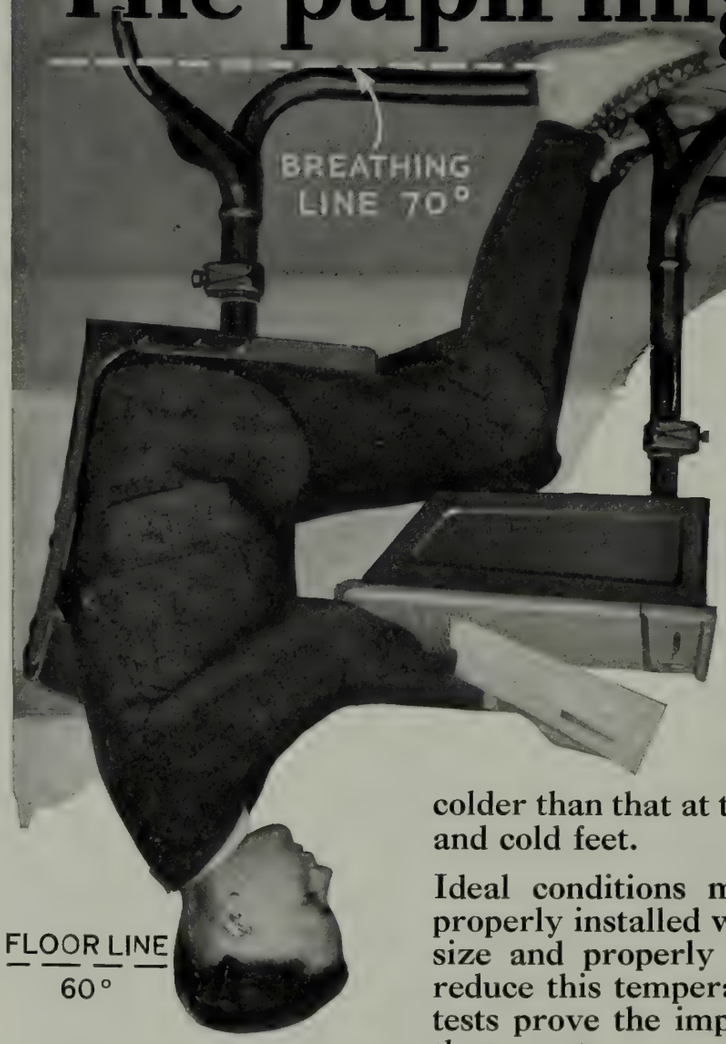
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STANWIN CASEMENTS · NORMAN CASEMENTS · UNIVERSAL CASEMENTS

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—so far as the temperature found in some school rooms is concerned

UNDER bad head or floor temperatures and ventilating conditions a pupil cannot concentrate much better than he could if he were turned upside down. The floor temperature in classrooms with ordinary ventilation is often 10 degrees colder than that at the breathing line. This results in hot heads and cold feet.

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Specialists in school architecture, decoration and education, all agree that colorful surroundings have a definite effect on the mental comfort and cheerfulness of pupils—and have discovered that one of the most desirable and practical ways to bring color into the schoolroom is to install resilient *Sealex* floors.

Sealex floors are as far removed from the hard, drab-looking school floors of yesterday as the fountain pen from the stylus. They are not only colorful—they are quiet, comfortable and sani-

(*See next page*)



For floors in kindergartens, gymnasiums, etc., special decorative or utilitarian designs may be inlaid in contrasting colors—thus providing permanent markers for games, class formations, etc.

(Continued from preceding page)

tary, as well! This last, because *Sealex* materials are spot-proof and stain-proof—easy to clean. Spilled things don't matter! Since neither wear nor every-day accidents will dull or mar their beauty, *Sealex* materials justify the use of pleasing colors underfoot.

Sealex floors may be as simple and inexpensive, or as richly decorative, as the location warrants.

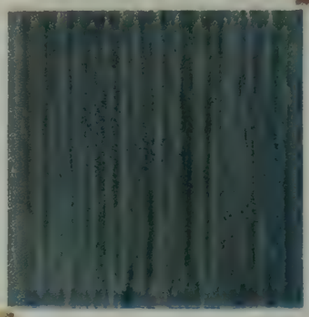
For ordinary class and study rooms, simply designed floors, such as *Sealex* Battleship Linoleum or *Sealex* Jaspé Linoleum, are indicated, and the soft harmonious tones are particularly pleasing and restful.

But for such locations as the entrance hall, dining room, library, private office, etc., nothing could be more appropriate

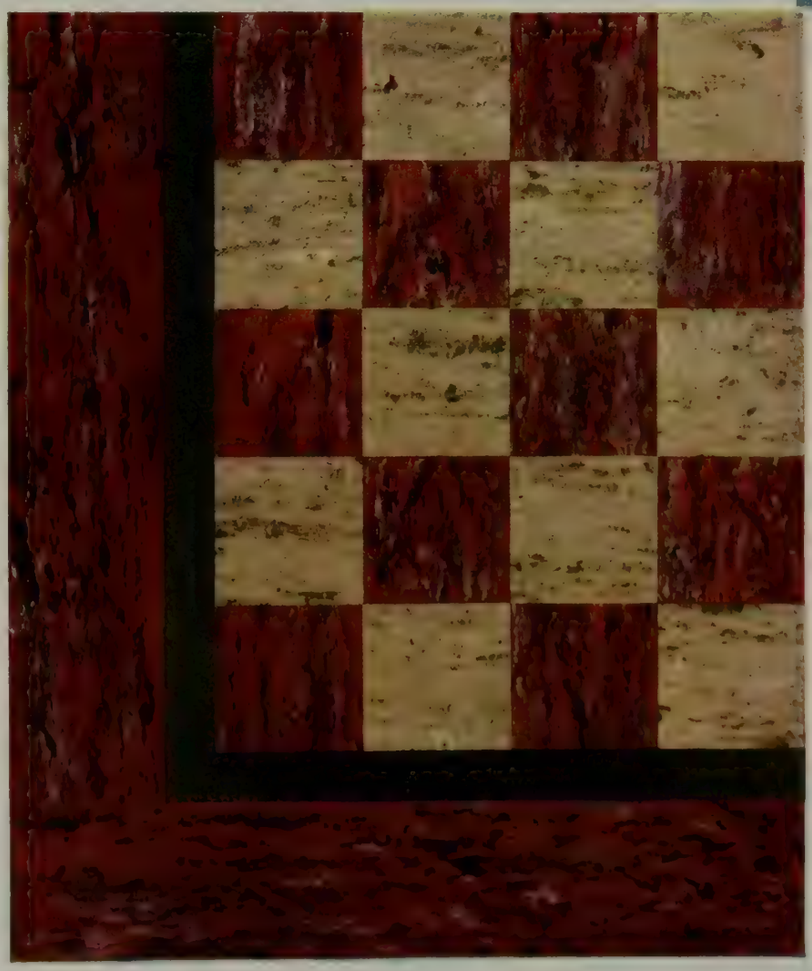
New Jaspé Effects

The new pastel shades in *Sealex* Jaspé Linoleum will be welcomed by school executives who realize the possibilities of this subdued, yet decorative, type of floor.





Here are illustrated two restful colors of *Sealex* Jaspé Linoleum. Above: "Rose-glow." At left: "Lake-blue."



than designed-to-order floors of *Sealex* Treadlite Tile—plain or marble-ized. These cork-composition tiles offer distinctive beauty. The floor-design at the left illustrates the use of two of the many tile colors available.

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SEALEX LINOLEUM

(See preceding page)



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HOW MANY TIMES, when driving through a suburb, have you seen old residences which could be refined by your architectural skill, and converted into charming modern homes? More than once, we'll wager. • When the remodeled home arises, in your mind's eye, you rearrange and renew the windows. For windows date a house more surely than any other one building material. • Often casements in a new porch or sun-room will go a long way toward re-styling the home. And when you think of windows, you think of Lupton Residence Casements. They are made to give your clients the utmost in service for years to come. Their slender steel lines bring crispness to exteriors and buoyancy to each room from within. They are thoroughly practical. Frames are drilled for screen and drapery attachments. Screens and brackets can be ordered with the window. Both are attached in a few seconds. • Lupton Casements are made in standard sizes to suit a wide variety of architectural treatments. Their cost is surprisingly reasonable. Consult your current edition of Sweet's Catalog for complete details. David Lupton's Sons Company, 2209 East Allegheny Avenue, Philadelphia, Pennsylvania.

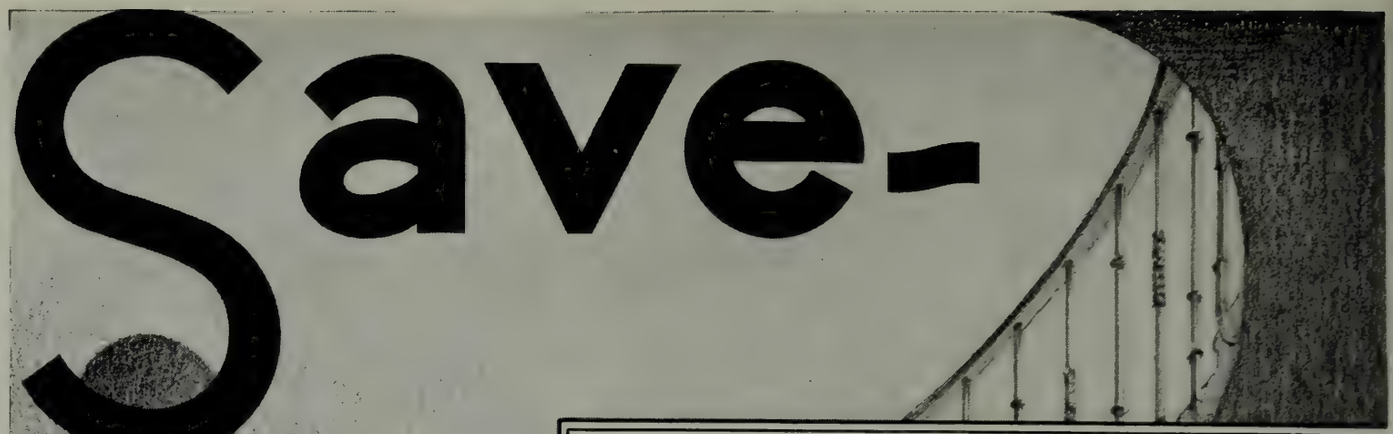
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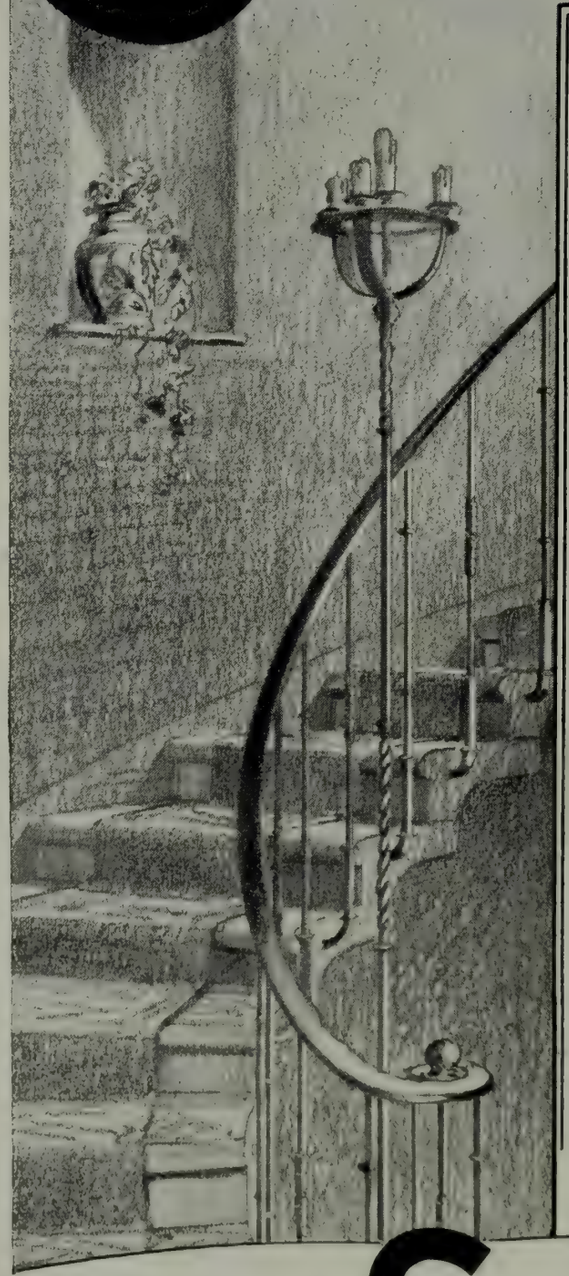
where steel is fused with sincerity

Before and after pictures of the residence of Mr. W. C. Harvey, Plainfield, N. J. Mr. Lewis Bowman, architect.



Save-





Home Beauty
Is More than Skin Deep

Many a recently built residence is proving a disappointment. The exterior is fresh and modern, but inside—the structure looks down at the heel—twice its age. The plaster has cracked or fallen—lath streaks have developed.

Marred plastering is almost an infallible sign that Steel Lath has not been used. For home beauty is more than skin deep. The lath—not the plaster—usually determines whether the interior of a home will age quickly or remain attractive for years.

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Steel lath does not warp and swell from moisture—nor dry out and shrink. As long as the structure of the building itself remains solid, the plaster stays in place—cracks do not develop. Lath streaks are unknown. The home interior remains fresh and beautiful—redecorating expense is halved.

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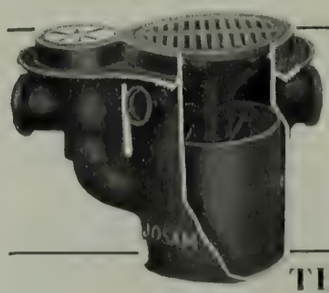
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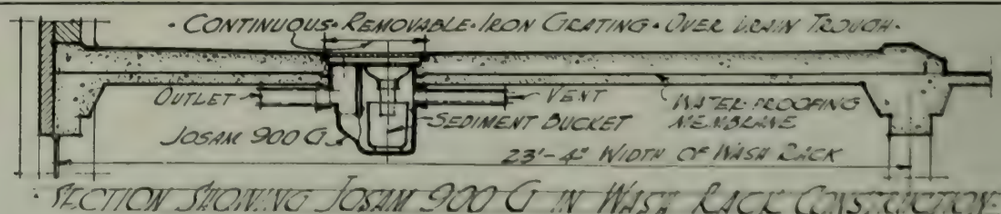
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THE ARTIST appreciates its symmetry of mass, and its design so thoroughly modern throughout. The engineer recognizes its soundness of construction and its completeness of equipment. Owners, workers and customers delight in the perfect functioning of its moving parts. Here, in the Stewart Store, as in so many fine new structures, Sargent Hardware contributes beauty and usefulness.

Sargent designs are masterfully conceived. Authentic reproductions, artistic adaptations and strictly modern patterns offer a wide choice for every architectural style. Sargent materials are the finest—of solid brass or bronze. Sargent workmanship is expert, backed by generations of experience. Such outstanding qualities have placed Sargent Hardware in the country's finest buildings—residences, stores, hospitals, hotels, apartments; public, educational and office buildings. Sargent & Company, New Haven, Connecticut; 94 Centre Street, New York City; 150 North Wacker Drive (at Randolph), Chicago, Illinois.



At left is illustrated the special hardware design of the Sargent equipment in the Stewart Store, Fifth Avenue, New York, Warren & Wetmore, architects.



SARGENT

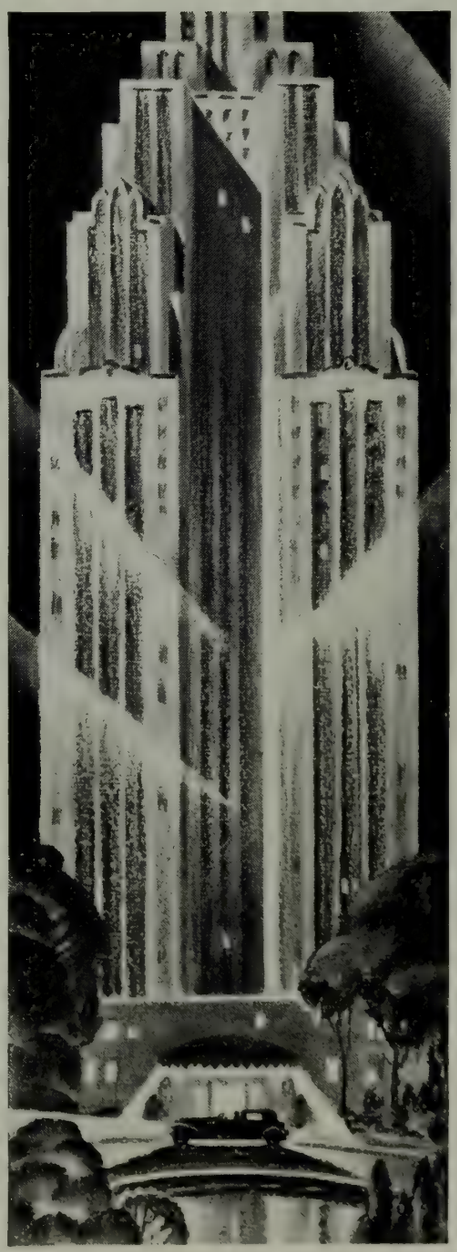
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ARCHITECTS

EQUITABLE LIFE BUILDING
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NEW YORK

F. W. Dodge Corporation
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March 28, 1930

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In the first place, if Dodge has detailed information about our jobs, many persons will secure it from you rather than telephoning, writing or calling upon us. This saves time.

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Ed. Van Vleck

VV/FK



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use DODGE SERVICE

The architects are justly proud of their reception room. Floor is of teakwood in special pattern developed by them. Pilasters are marnot wood from the East Indies. Japanese ash in peanut figure is used for the panels. Narrow bands of zebra wood are under the cornice and at either side of each panel. The table top is inlaid with Australian mountain ash and Italian olive wood.



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LAVISH in its appointments—here is a modern office building basically constructed to insure the investor the smallest possible rate of depreciation.

If the selection of Bridgeport "Plumrite" Brass Pipe is a guide to the type and length of service this building will render, it should, in truth, be destined for remarkable service.

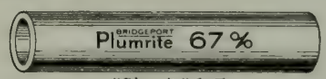
Attention-free, trouble-proof performance has been synonymous with Bridgeport "Plumrite" Brass Pipe for upwards of fifty years. In what other way can any product prove its merit so conclusively? Each year the meaning of CONFIDENCE in Bridgeport "Plumrite" Brass Pipe becomes more apparent.

All "Bridgeport" Pipe Is "Plumrite"

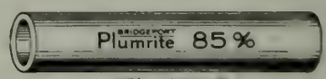
To identify mixtures, to protect you, these trademarks appear every nine inches on all Bridgeport "Plumrite" Pipe.



"Plumrite" Standard
For Good Water Conditions. Known as Muntz metal. Contains 60 % Copper and 40 % Zinc. Can be bent hot and cold. Very satisfactory. Highly recommended.



"Plumrite" 67 %
For Good Water Conditions. Contains 65 % to 68 % Copper —balance Zinc. Can be bent cold only.



"Plumrite" 85 %
For Treated, Salt, and Corrosive Waters. Contains 85 % Copper, 15 % Zinc. Known as Red Brass. Also recommended for ground service.



"Plumrite" Copper
For Treated and Corrosive Waters. Contains 99.99 % Copper. Very satisfactory.



"Plumrite" Admiralty
For Hot and Cold Salt Water. Contains 70 % Copper, 1 % Tin, and 29 % Zinc. Very satisfactory.

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General Hospital
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The Complete Holtzer-Cabot Catalogue appears in Sweet's—Pages D-5353-5385.

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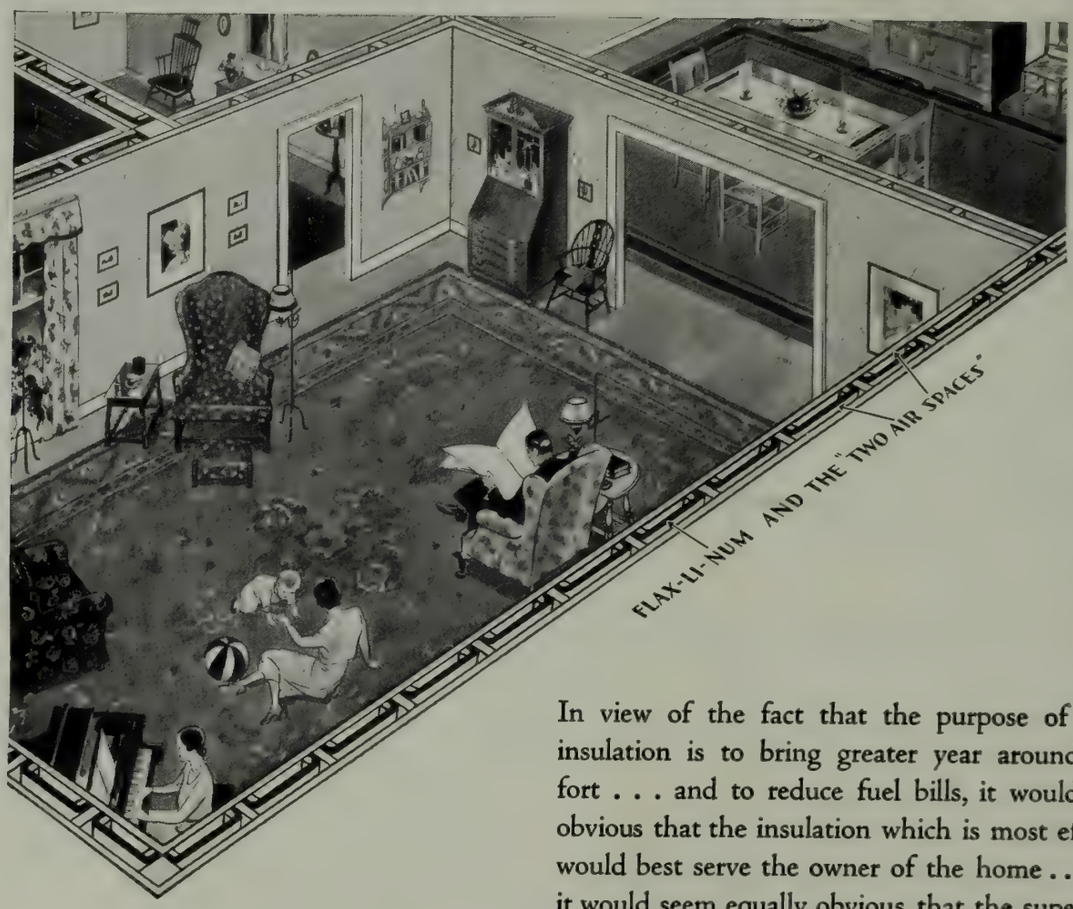
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Send me complete information about Flax-li-num. Also facts about the "two-air space" method.

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You realize how vital this experience is when you consider how much more there is in refrigerator building than appears on the surface. For, important as the exterior and interior are from the standpoint of fine appearance and sanitation, it is what lies between—in the wall construction that determines the efficiency and service of the refrigerator.

Every McCray is heavily insulated with pure corkboard, sealed with hydrolene cement, making perfectly air-tight joints. In every hidden detail the finest materials, and the most expert craftsmanship build staunchness into the McCray —the ability to resist heat, and retain cold.

It is this in-built quality which insures the efficient economical service always associated with the name McCray. Like the sterling mark on silver, the McCray nameplate has come to be recognized during these two-score years of quality manufacture, as the assurance of thorough-going value.

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The McCray illustrated is the Model No. P332, one of a series of new All-Porcelain refrigerators for Hospitals, Schools, Institutions, Hotels, Restaurants — in fact wherever perishables must be kept fresh in large quantities.

ALL McCRAY MODELS MAY BE USED WITH MECHANICAL REFRIGERATION OF ANY TYPE

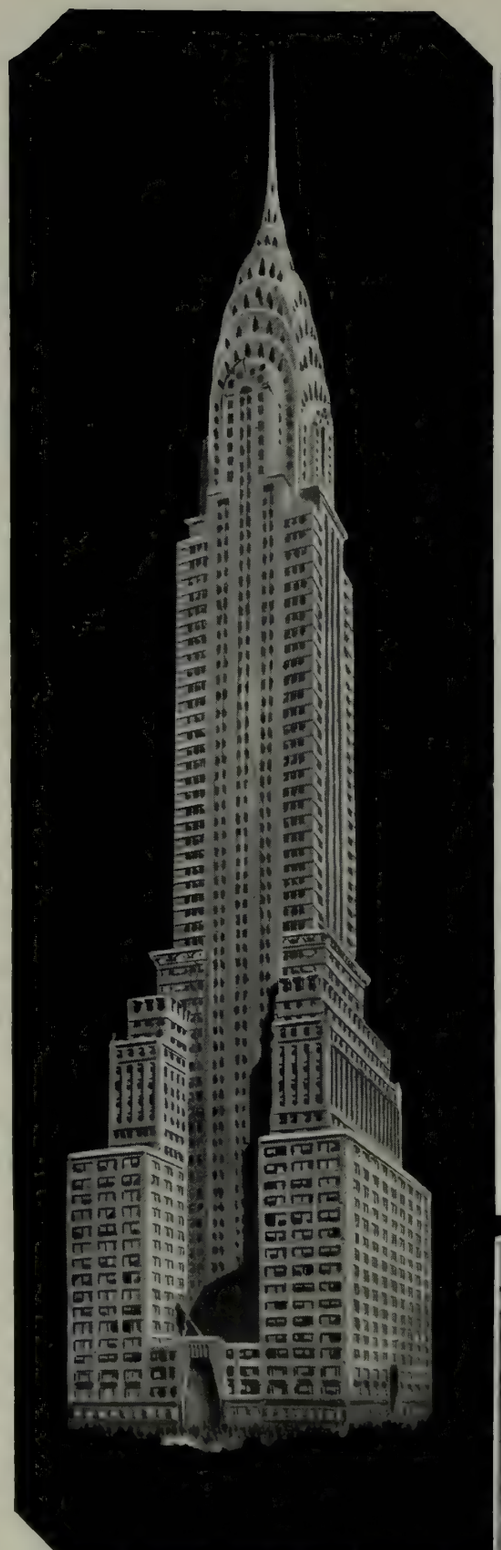
Architects, send now for latest catalogs showing all McCray models for every commercial purpose, and portfolio giving complete information. McCray builds to order to meet particular requirements. Send rough sketch and our engineering department will submit a proposal without obligation.

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ACHIEVEMENT

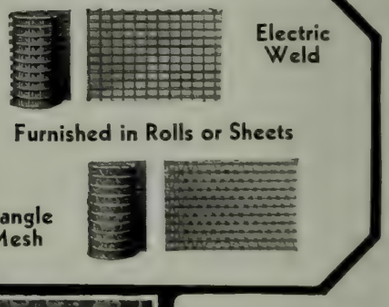
TYPIFYING the spirit of achievement in modern architecture, the new Chrysler Building also exemplifies the important part being played by wire fabric in every type of structural development.

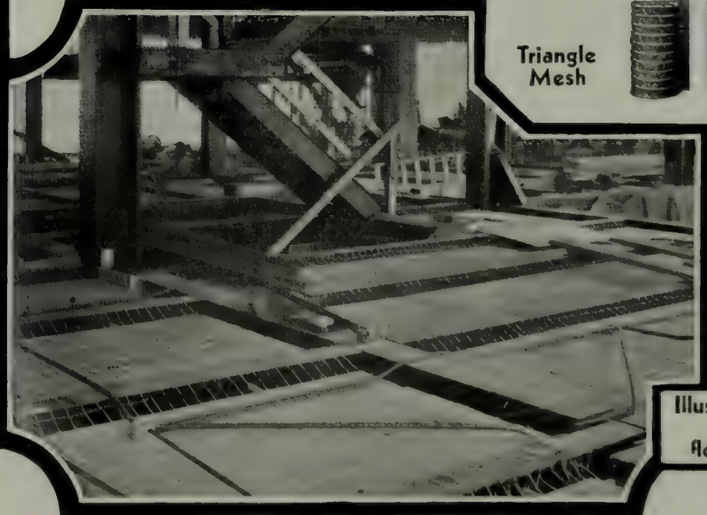
Here — where cinder concrete floor arch reinforcement is called for, American Steel & Wire Company Wire Fabric is recognized as standard. Its definite factors of safety, its great strength and permanency, win for it the enthusiastic approval of architects and contractors.

Information, including engineering data on Wire Fabric for concrete reinforcement, will be furnished on request.

Wire Fabric

The Steel Backbone of Concrete





Illustrating Wire Fabric used as floor reinforcement.

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY UNITED STATES STEEL CORPORATION

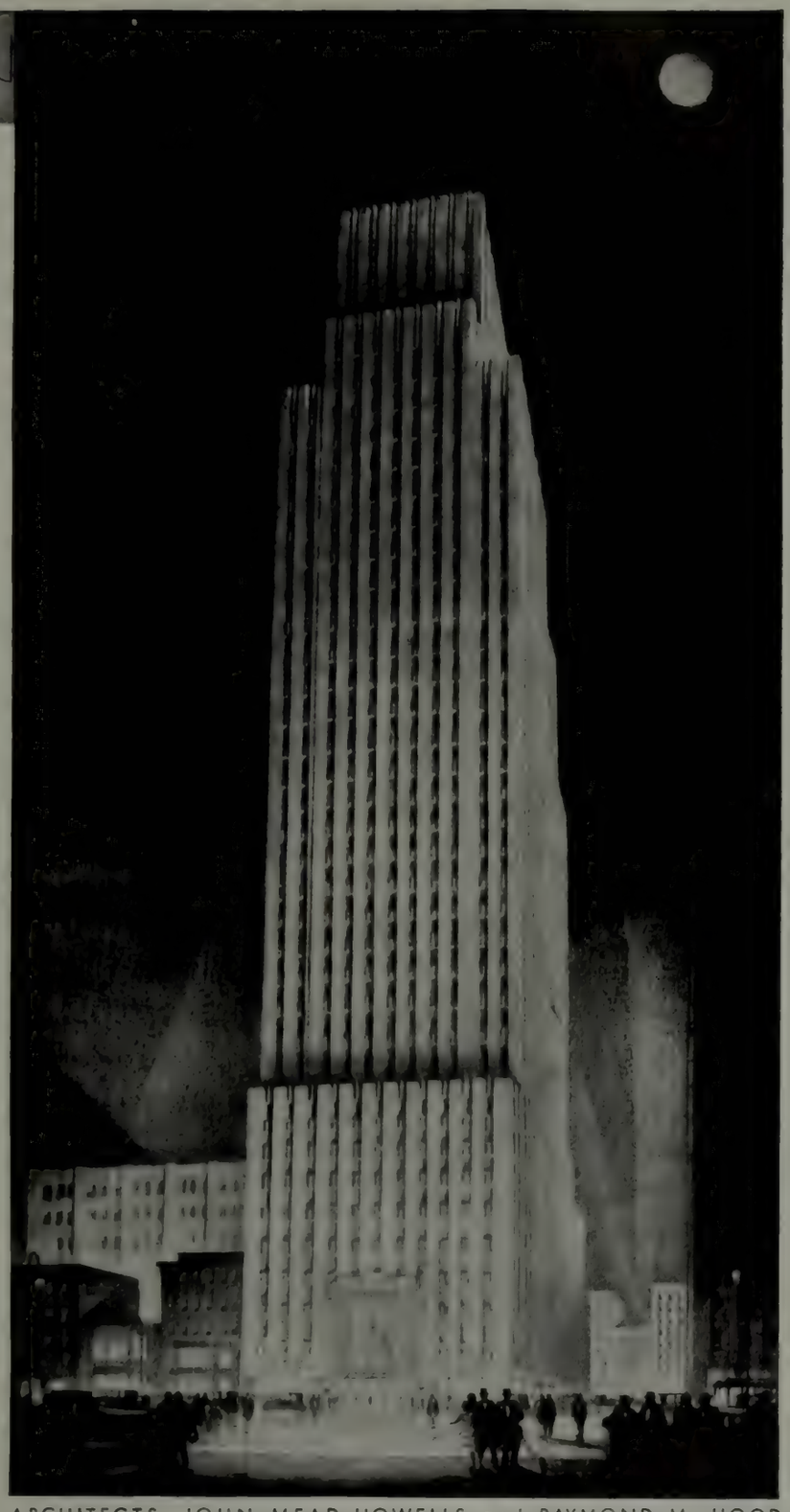
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ARCHITECTS: JOHN MEAD HOWELLS and RAYMOND M. HOOD

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The beautiful Wilshire Tower, Los Angeles, built entirely of concrete

CONCRETE *sets a magnificent stage for sales*

As modernly conceived, architecture has become an important ally of business. Farsighted merchants know that sales are stimulated by an attractive setting. This is especially true with merchandise of high cost—yet even the great ten-cent store chains find good architecture an asset.

To provide the stage for modern merchandising, many architects have used concrete construction not only for purely structural purposes, but for exterior surfaces and ornamental detail. In their skilled hands, concrete provides an environment in which dignity is tempered with grace, and massiveness becomes a thing of rare beauty.

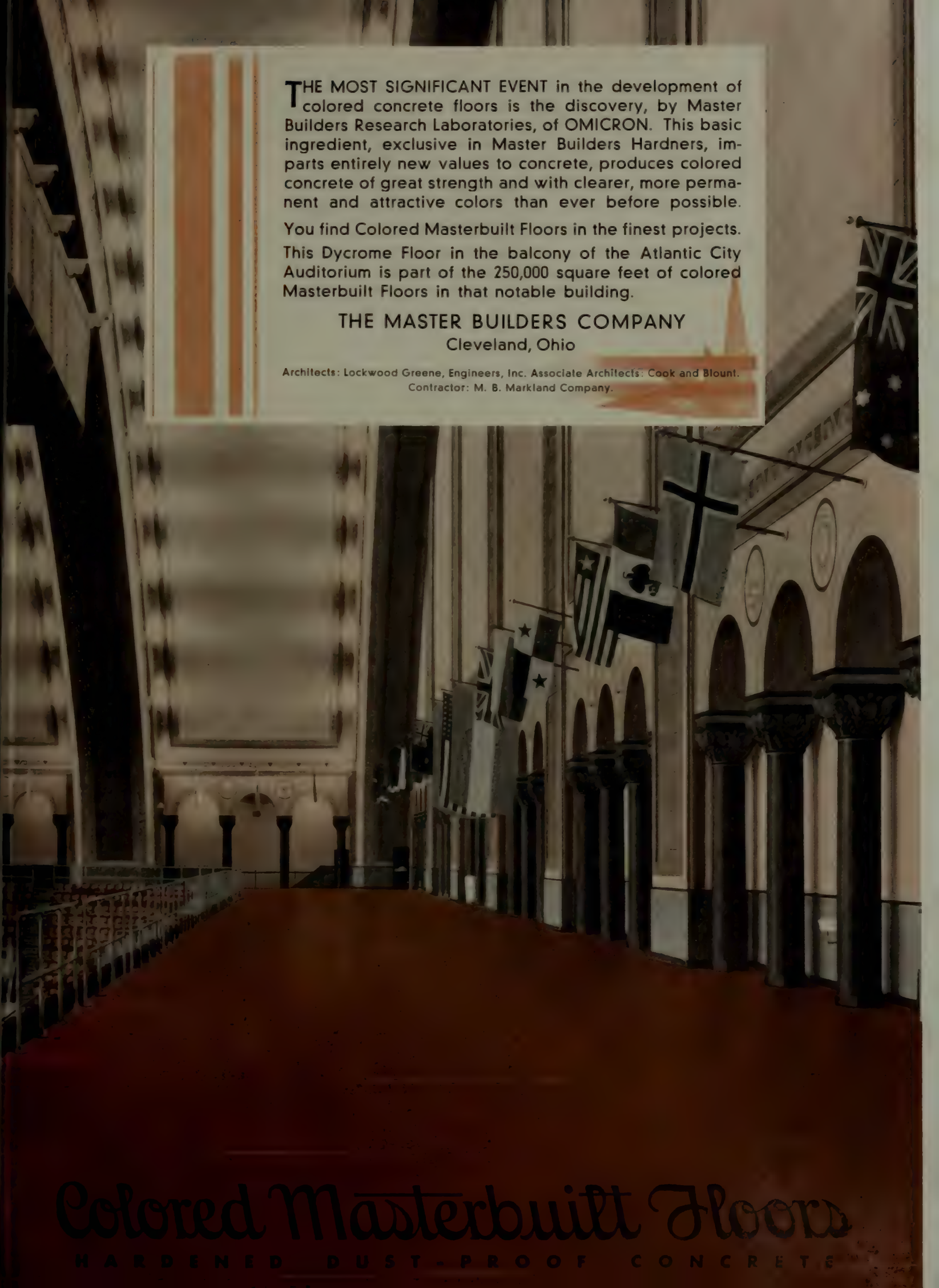
Because it is firesafe, concrete affords utmost protection. Because it endures through generations, its economy cannot be questioned. Throughout the structure it assures uniformity, rigidity, strength. From bedrock to skyline, concrete renders an unmatched service.



An example of fine craftsmanship in concrete. Decorative details, including panel over entrance, cast in place *at the same time and of the same concrete as the walls. Exterior flat surfaces finished with tinted portland cement stucco. Gilbert Stanley Underwood, Architect; H. W. Baum Company, Contractors, both of Los Angeles*

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THE MOST SIGNIFICANT EVENT in the development of colored concrete floors is the discovery, by Master Builders Research Laboratories, of OMICRON. This basic ingredient, exclusive in Master Builders Hardners, imparts entirely new values to concrete, produces colored concrete of great strength and with clearer, more permanent and attractive colors than ever before possible.

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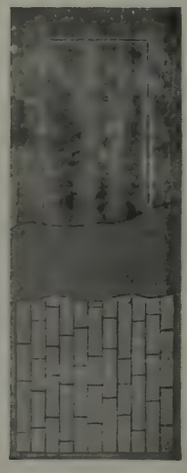
Roddis Trade Mark

This Red-White-Blue Dowel Trade Mark is on the edge of the Roddis Flush Door. It is the Roddis mark of identity and quality.

RODDIS

FLUSH DOORS CUSTOM MADE

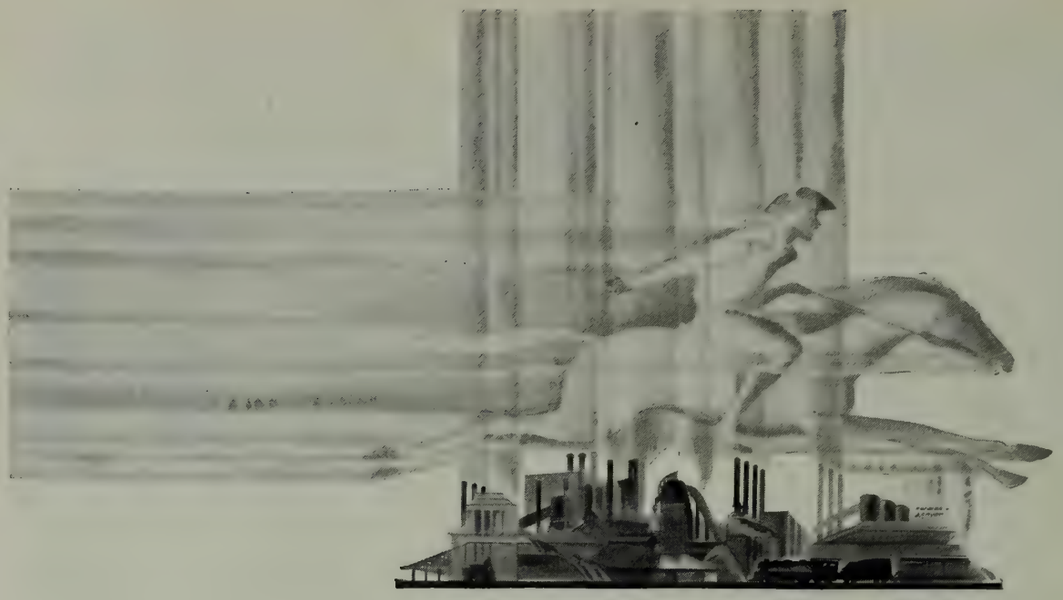
Surprising ornamental possibilities are available with Roddis Flush Door completely solid, five-ply construction. Special styles are furnished to order, of Roddis conception or according to the architect's design and detail. At the left is a more conventional Roddis special door: of Sawn Oak with V-grooves, ornamental studs and clover leaf opening; can be made in any wood. At the right is an ornamental one-light door, of Sawn Oak Veneer, with special grooves. Whatever the requirement, Roddis Flush Door construction can be used: standard styles as catalogued by Roddis, or custom made to order.



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Paul Revere

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"*It is the universal belief that no one in this country could make Copper so malleable as to hammer it hot. I have farther found it a Secret that lay in very few Breasts in England.*

"*I determined, if possible, to find the Secret and have pleasure to say that after a great many trials and much expense, I gained it.*"

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Revere operates twenty-five per cent. of the nation's copper, brass and bronze rolling-mill facilities, including the two largest copper mills in the country. It has supplied copper, brass and bronze products for hundreds of America's most modern architectural giants. It is copper and brass maker to the famous names in electricity, automobiles, airplanes and radio. Seven Revere plants, located in five key industrial centers, provide unexcelled service to users of copper, brass and bronze.

A GLORIOUS HERITAGE

It is great for a business to have size. It is great for a business to have prestige. But it is greater for it to keep the vigor of the pioneer.

The spirit of Paul Revere is a glorious heritage.

Revere Copper *and* Brass

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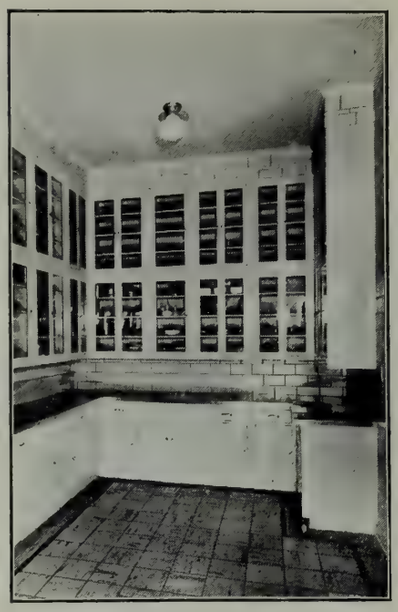
Uniformly high quality has made "A. W. G. CO." the preference of architects for more than a quarter of a century . . . Write for our new literature.

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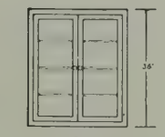
Farmers Bank Building, PITTSBURGH, PENNA.

Olean Standard Steel Units

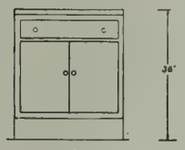
Equip these Immaculate Kitchens



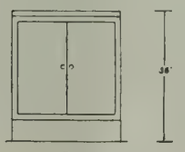
Above: Part of the butler's pantry in a recently completed residence, equipped throughout with Olean Standard Units.



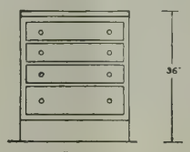
B
Upper Unit



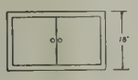
C
Base Unit



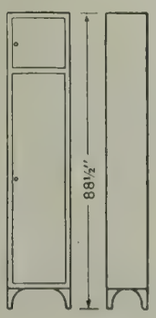
D
Base Unit



B
Base Unit



C
Upper Unit



Broom Closet

KITCHENS of any size may be equipped efficiently, permanently and economically with Olean Standardized Steel Cabinets.

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Every installation guaranteed to comply with architect's specifications.

Complete plant facilities devoted exclusively to building the best quality of steel cabinetry at a consistent price.

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Above: All seven upper and base units in this efficient Kitchen are Olean Standard. A Monel Metal top completes the arrangement.



Right: Another view of the butler's pantry shown in the upper left. Thirty-nine Olean Standard units were used in this installation, exclusive of the kitchen equipment.



Left: Seven standard sections, all of Monel Metal equipped this attractive, modern kitchen.

OLEAN METAL CABINET WORKS, INC.

Olean, N. Y.



HARRIS and SOHN, *Architects* PHOTO BY AMEMYA

Authentic PLASTER ORNAMENT

The Genuine Spirit of Adam Design, Circa 1770

BECAUSE of their intricate delicacy, the designs of the Adam Brothers are considered by many to be the culmination of the Georgian Period. And the execution of Adam designs in plaster is perhaps the severest test of the modeler's craft. Careful attention to detail is imperative if the spirit of the original is to be preserved.

The ceiling pictured above, in the ballroom of the Molly Pitcher Hotel, Red Bank, New Jersey, was adapted from old Adam ceilings in the residences of the Countess of Derby and Lady Wynn. Fluted columns and column caps are also in plaster, carefully scaled to harmonize with the Adam ornament.

* * *

This room was created by Jacobson & Company entirely from ornament listed in their several catalogues which are available to recognized architects and decorators. The new catalogue, comprising 3109 new designs never before published, is now ready for distribution. If you have not already done so, please write to make sure that your copy is forwarded promptly.

JACOBSON & COMPANY

239-241 East 44th Street
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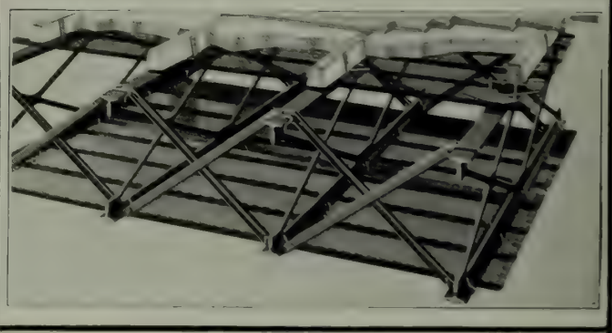
not very long ago!

Almost as great as the improvements in transportation have been the changes in building methods. For example, note how rapidly wood joists and wood cross bridging are giving way to the Improved Firesafe Floor and Roof Construction.

It provides unsurpassed strength and rigidity, firesafe construction and a minimum vibration under load.

The Kalmantruss Joist has no bolts, rivets or welds in tension. One-piece joints make it unusually dependable.

Kalman Rigid Bridging acts both in compression and tension. Accurate spacing of joists and distribution of load are obtained in such a way that the entire construction acts as a unit. Erection is faster, more economical.



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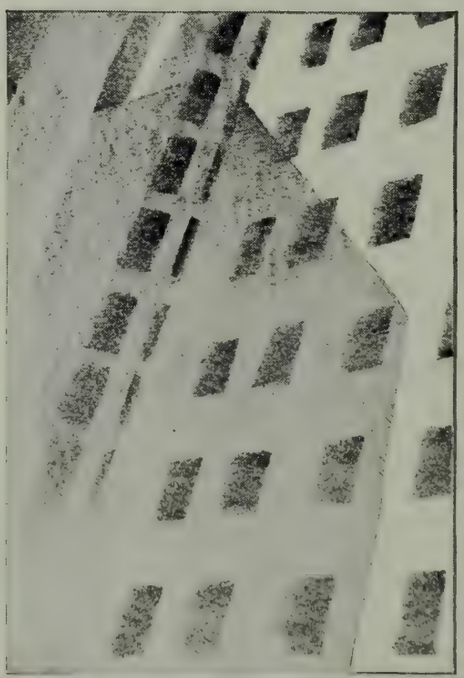
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BRANCHES IN ALL PRINCIPAL CITIES





High Cost Areas in Building Maintenance

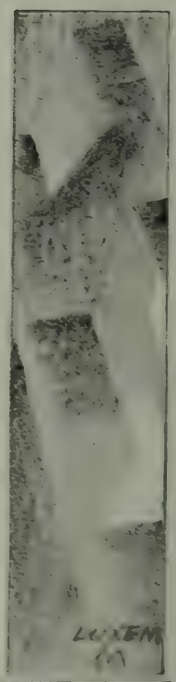


The *outside* panes of the myriad windows in modern buildings are high cost areas in building maintenance.

OUTSIDE cleaning requires the services of high waged professional cleaners, who because of the great risk, must work cautiously. Caution means lost time. Lost time means higher costs. Small wonder that building owners view window cleaning as a tremendous item of expense!

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By simply reversing the sash, the outside of the window swings in—where it may be safely and quickly cleaned. In hundreds of buildings, Williams Equipped Windows are effecting extraordinary savings in cleaning costs—savings that continue for the life of the building.



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WINDOW EQUIPMENT
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FOR WATERTIGHT BUILDING WALLS



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LIME MORTAR was used exclusively in early American masonry and the engineering literature of that period discloses no reference to the problem of leaky masonry walls such as today is engaging the serious attention of architects, engineers and contractors.

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110 A

Extra load bearing Piles



Load Test on one MacArthur Compressed Concrete Pile, North Jersey District Water Supp. Comm., Wanaque, N. J. Pile length, 43 feet, Load, 50 tons, Total settlement, 3-16 inches.
General Contractors, Summer Sollitt Co., Chicago, Ill.



Pile length 46 ft., Load 50 tons, Total settlement, 3-16 inches.

HERE are load tests that show how MacArthur compressed concrete piles stand up under extreme overloading. Engineers who have formed the habit of giving us repeat orders don't require load tests any more; but we are always willing to show just how good MacArthur compressed concrete piles really are.

Check your requirements against MacArthur qualifications:

PRODUCT	*proven*	CLIENTELE . . .	*illustrious*
EXPERIENCE . . .	*20 years*	RESPONSIBILITY .	*demonstrated*
EQUIPMENT . . .	*latest*	ENGINEERING . . .	*sound*
RESOURCES . . .	*unlimited*	PERFORMANCE . . .	*100%*
PERSONNEL . . .	*capable*	SPEED . . .	*record-breaking*



A 75 ft. all steel MacArthur pile driver at the Wanaque (N. J.) dam site.

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Giles Drilling Corporation an (affiliated company) will welcome the opportunity to submit estimates on core borings or soundings of any description.



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In Every Skyline–

"Bryant Equipped" Buildings are apt to predominate

THIS airplane view of San Francisco's Financial District is typical. Nine of the notable buildings within the camera's range are equipped with Bryant "Superior Wiring Devices"—the standard since 1888. Those architects who are desirous of serving their clients best take no chances—they specify and insist upon the use of Bryant Devices.

See our Catalogue in the new 4-volume Sweet's for 1930, Vol. D, pages 5188 to 5192

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MANUFACTURERS OF SUPERIOR WIRING DEVICES SINCE 1888

A-3

"Here, Lad—

I'm beginning to think there is something to this arc-welded design.

Those 'Studies in Structural Arc Welding' that Lincoln has been sending us —are you filing them?"

"No, Pop—

I've been *using* them to design several jobs that are on the boards right now.

My friend here, *Arc Welding*, has been made a real figure in our work through such studies. Plate 11 of the series has just come in and gives us General Specifications for structural arc welding—and also Plate 12, giving a comparison of designs for wind bracing.

These studies represent the first *real* help we've received on *design* for a trend that is right on us today.

We need these plates because an architect's work is not only dealing with facts, but with the application of imagination to what will prove to be facts in the near future—like television or mayhap—prohibition."

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— welds easier
— makes better welds
— permits greater output

because of the steady uniform arc throughout entire welding range, which is the result of:

Variable voltage design
Laminated magnetic circuit
Separately-excited generator field
Double control of welding heat
All steel construction

No other welder has all these features.

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"Stable-Arc"
LINCOLN WELDER

W-143

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Save with Steel

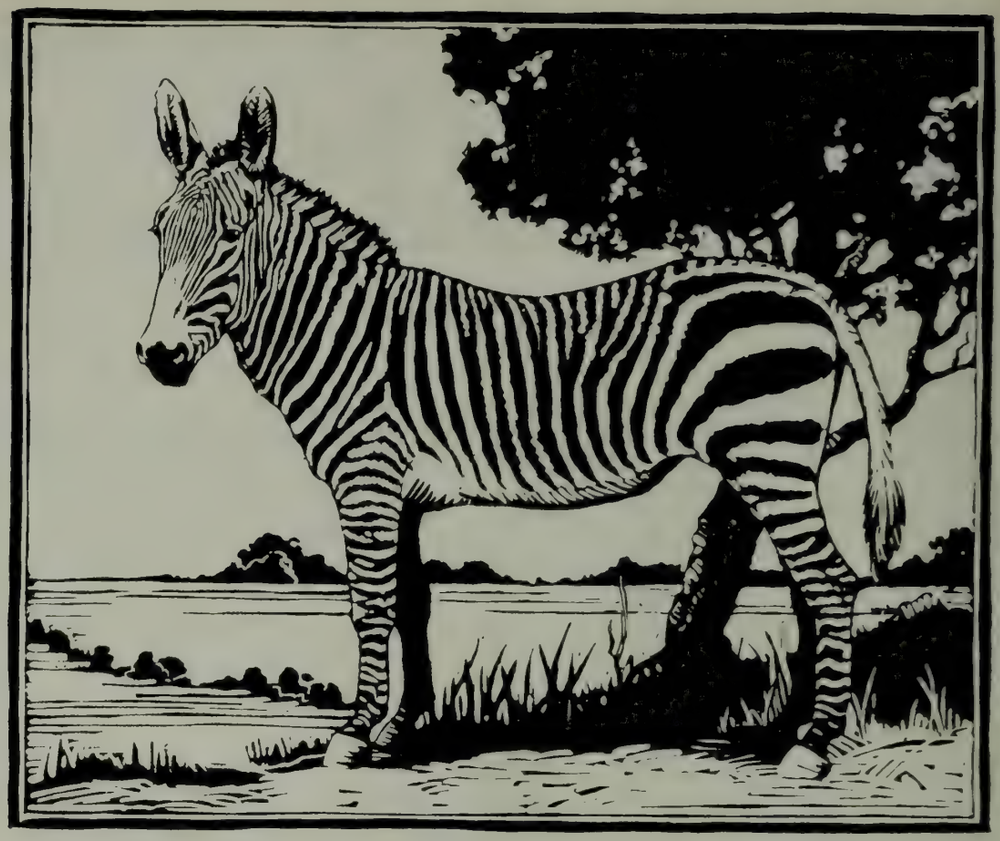
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Represented in the new 4-volume Sweet's for 1930, Vol. A, page 453

VICTOR OOLITIC STONE CO.
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. . . which child has the better chance?

FOR BALANCED LIGHTING, WEIGH:	
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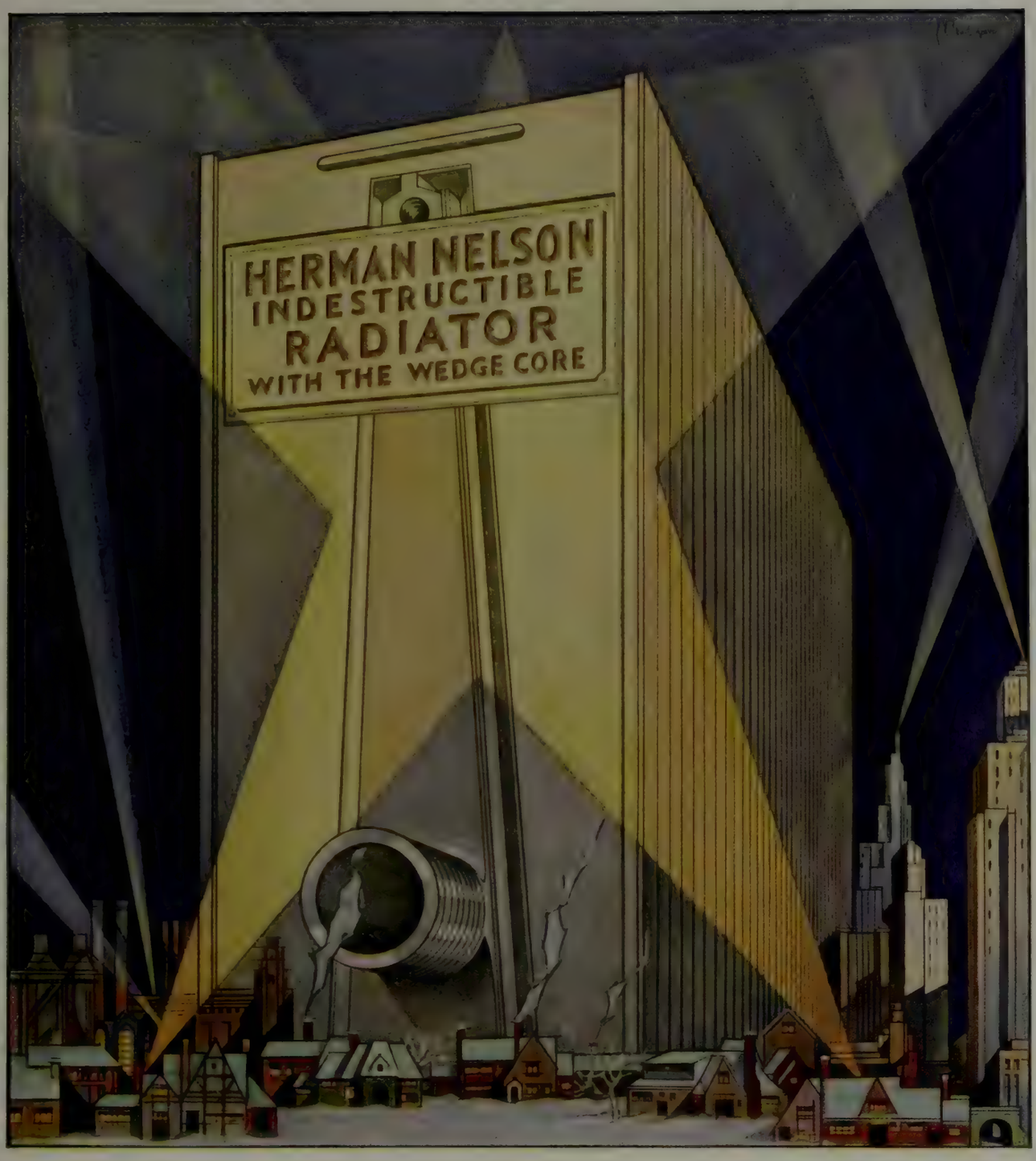
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P D—1



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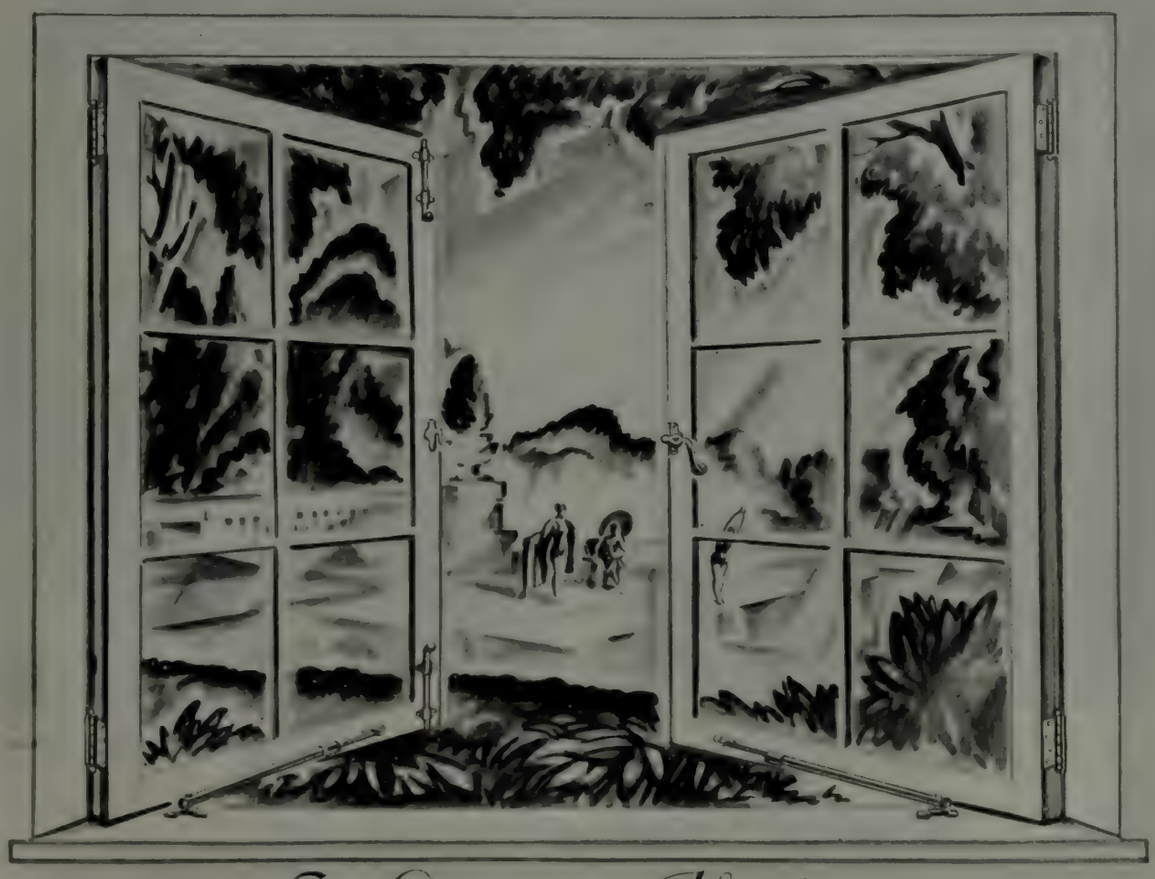
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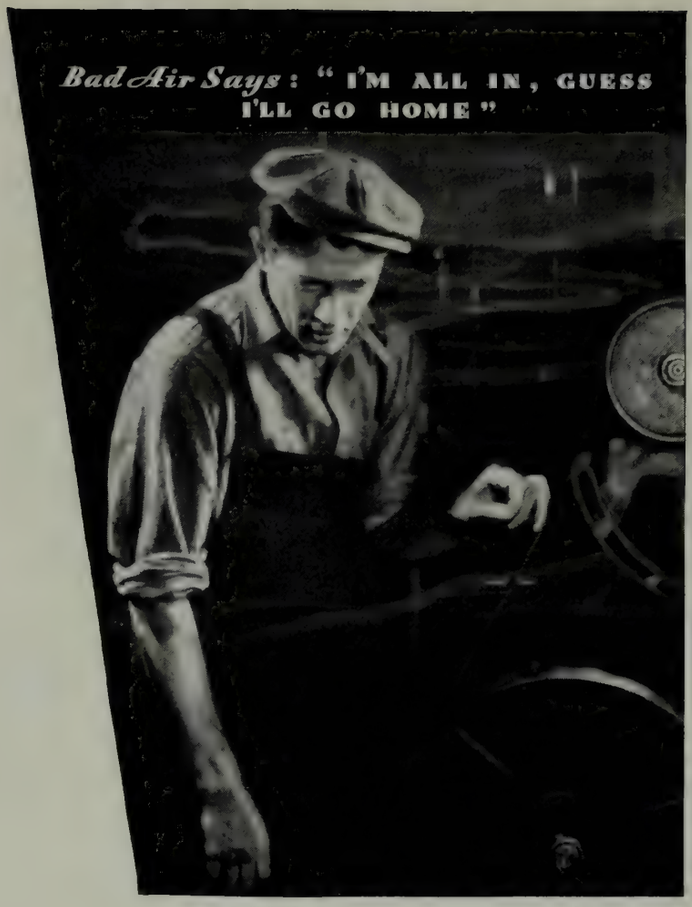
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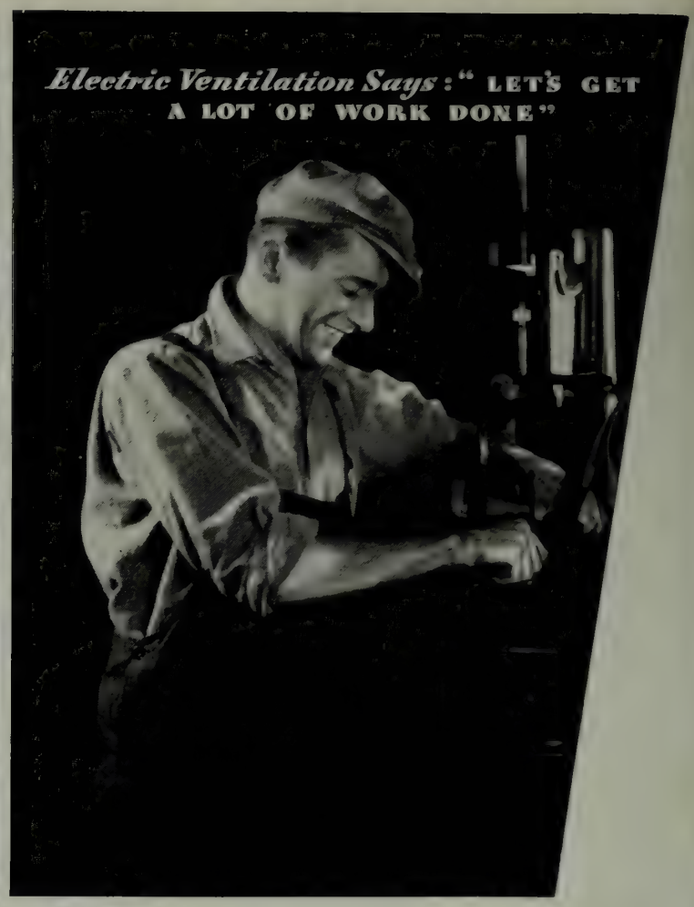
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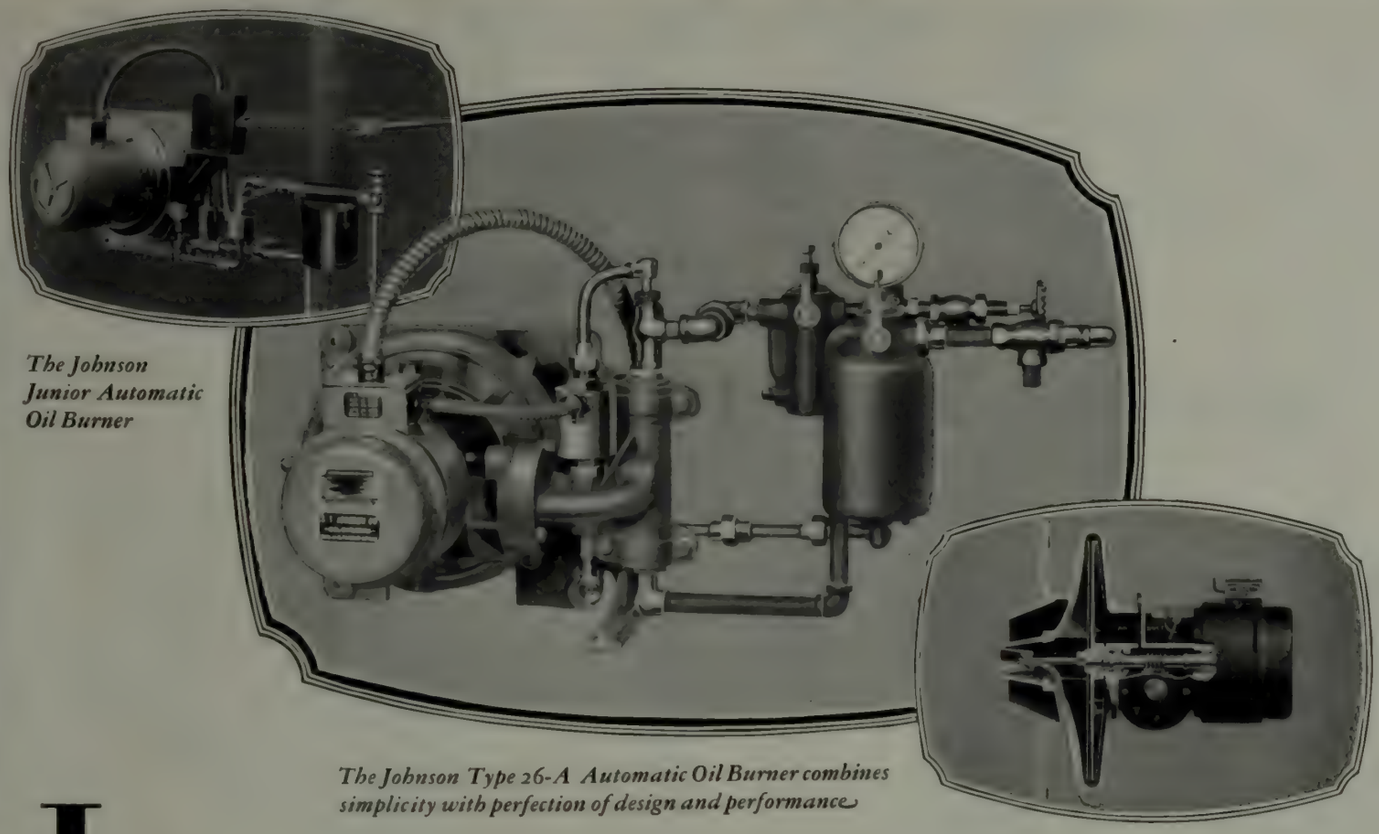
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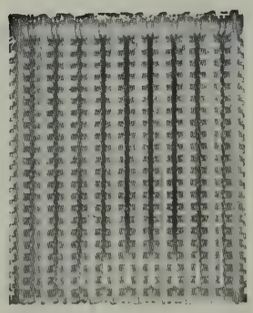
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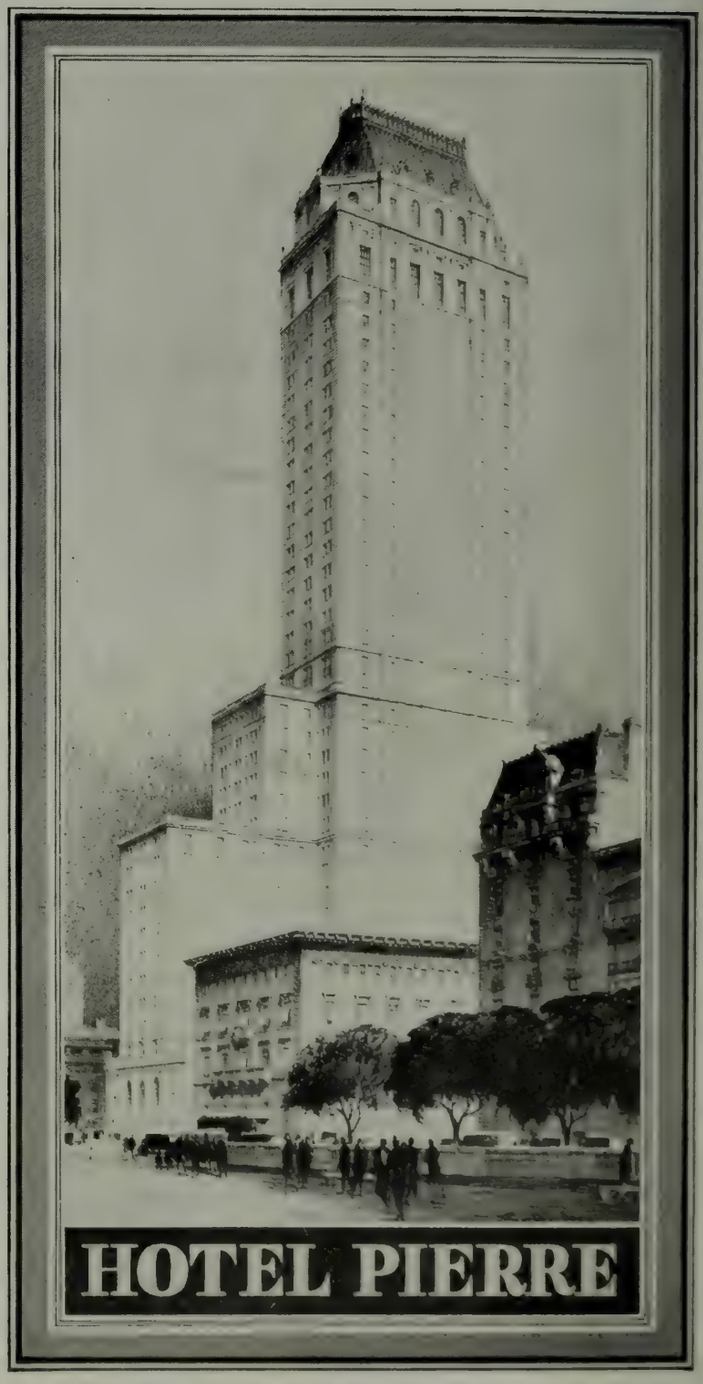


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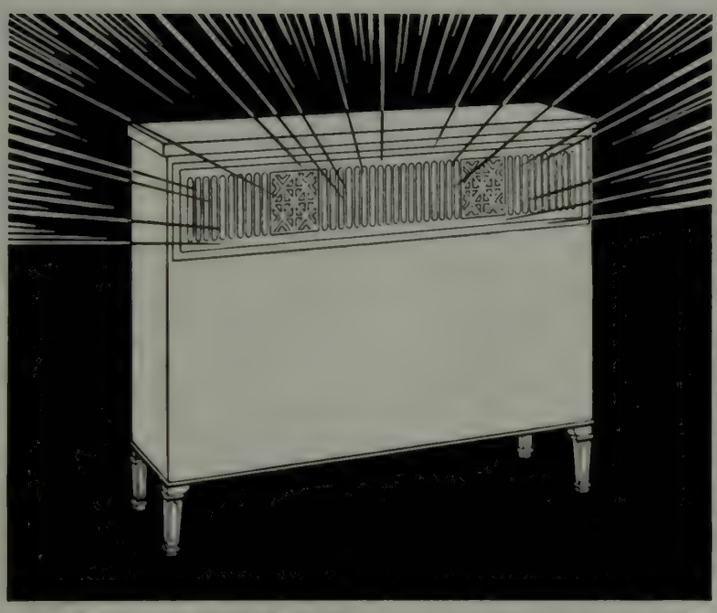


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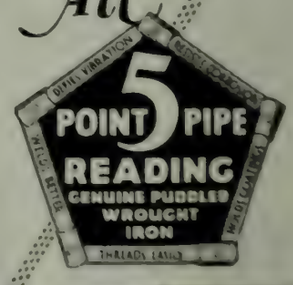
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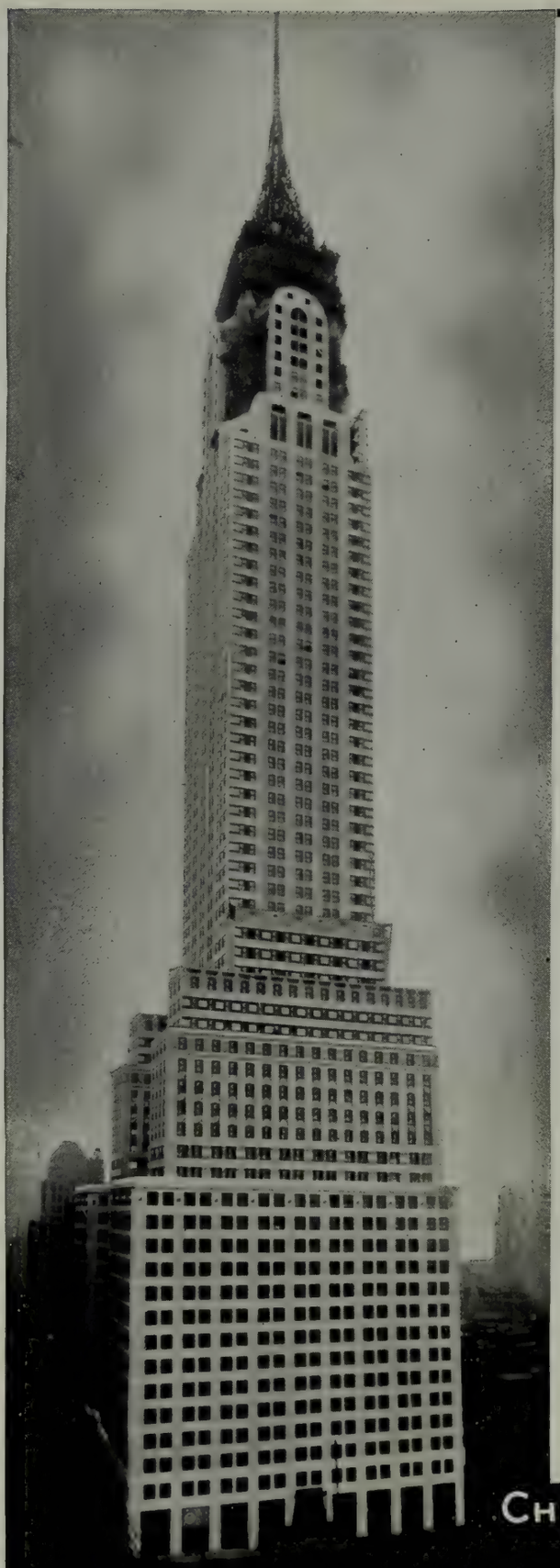
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Government tests show

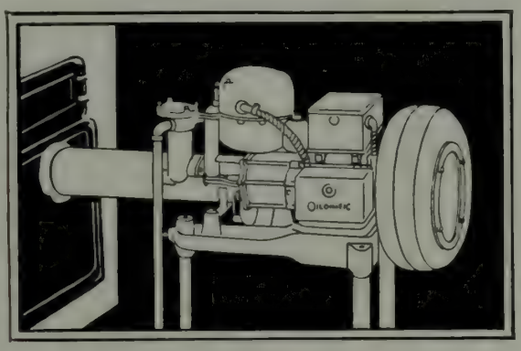
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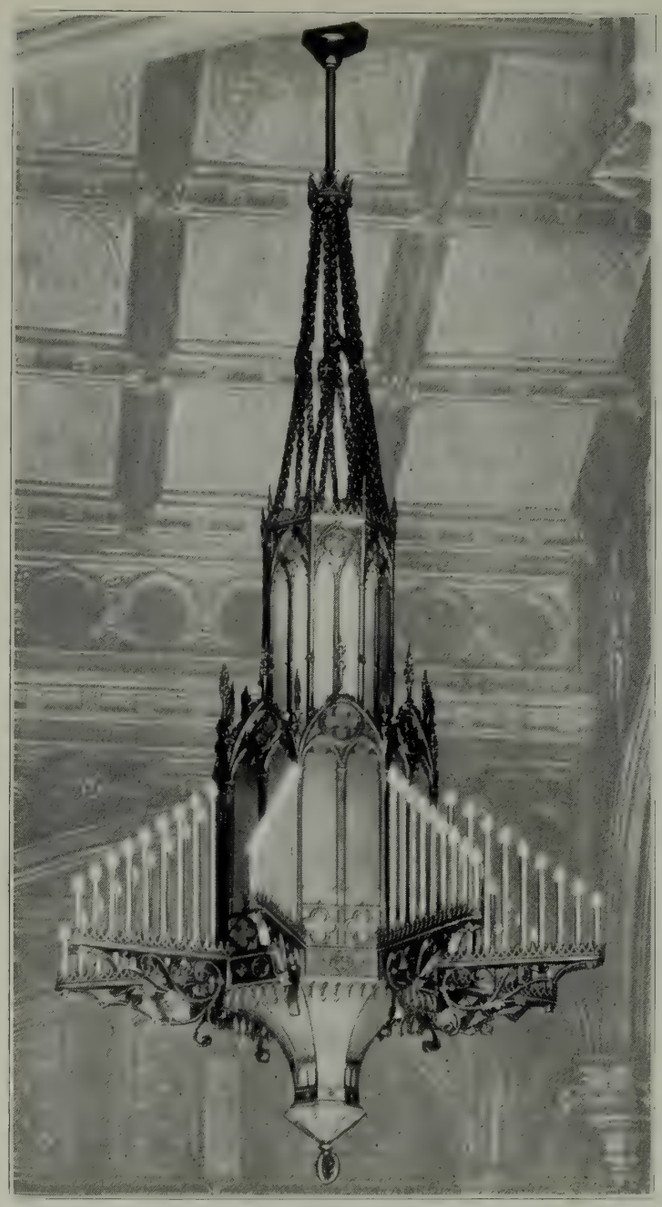
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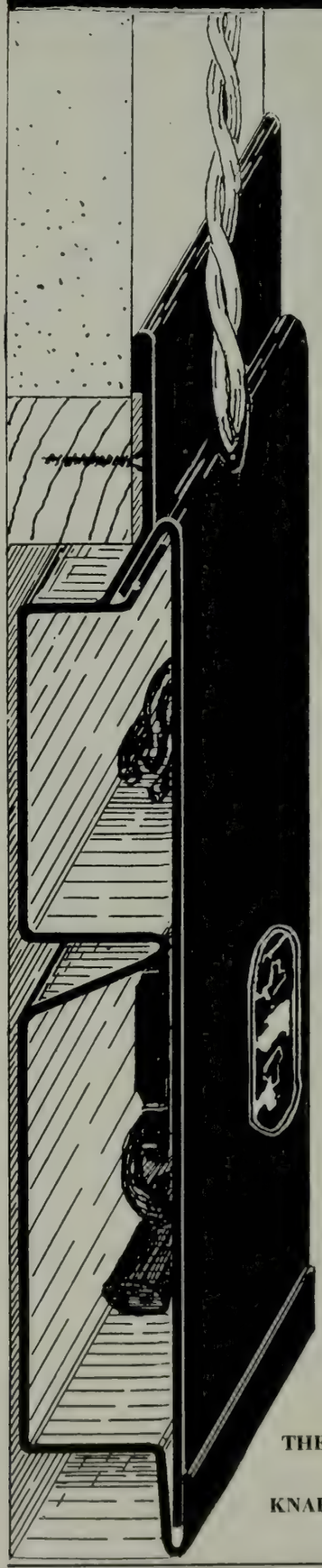
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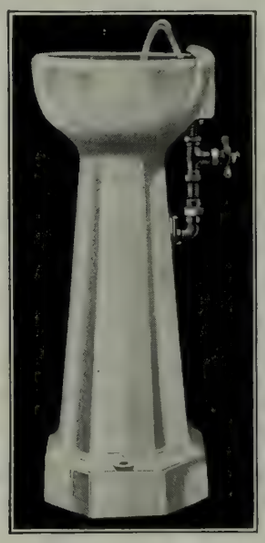
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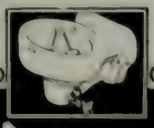


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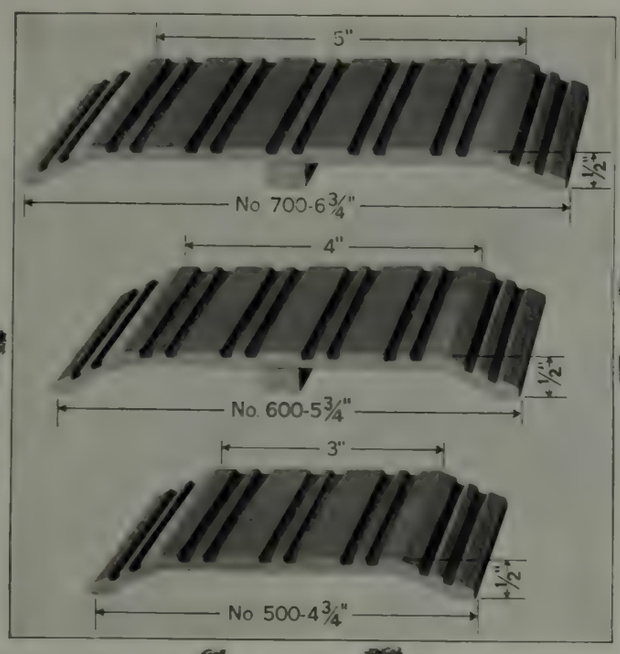
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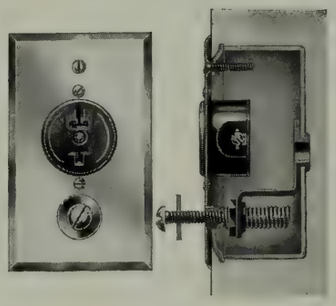
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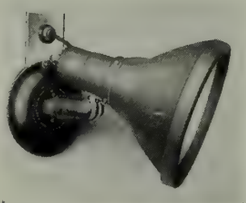
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FOR PERMANENCE

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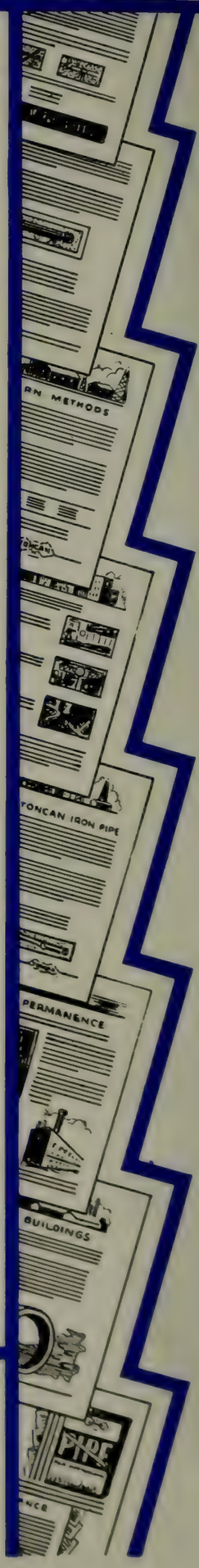


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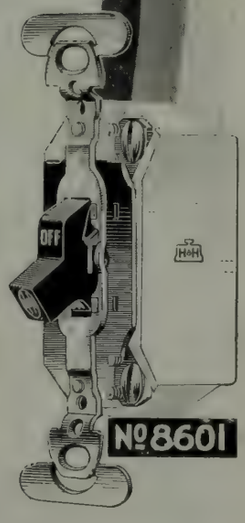
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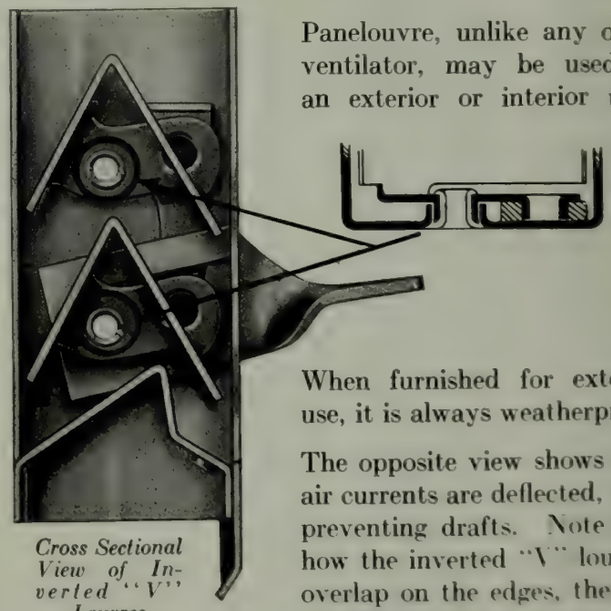


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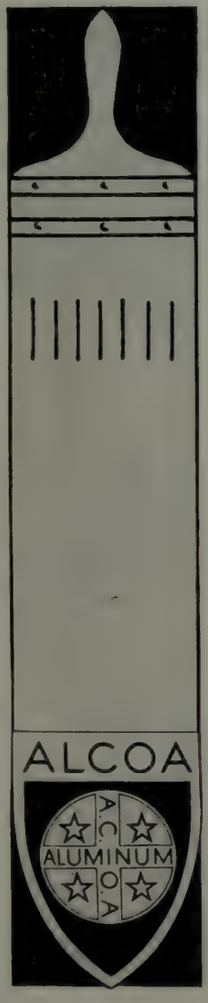
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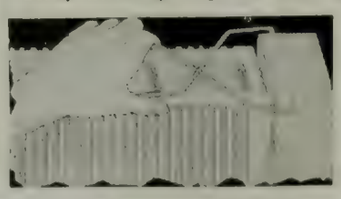
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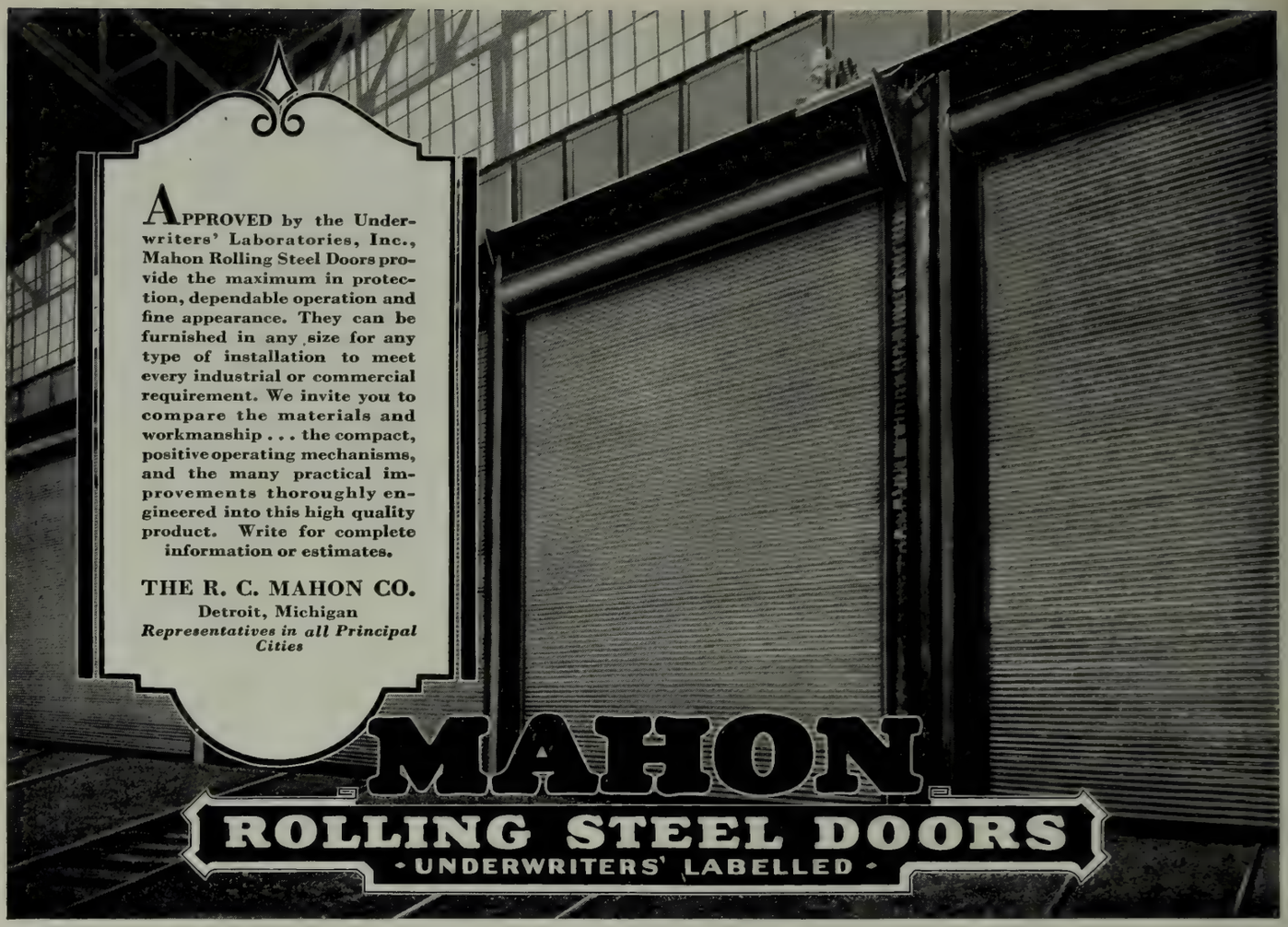
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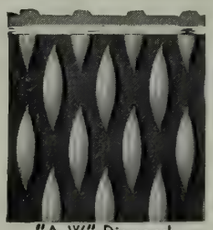
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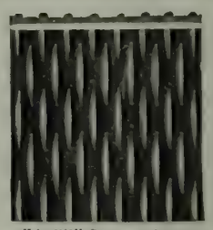
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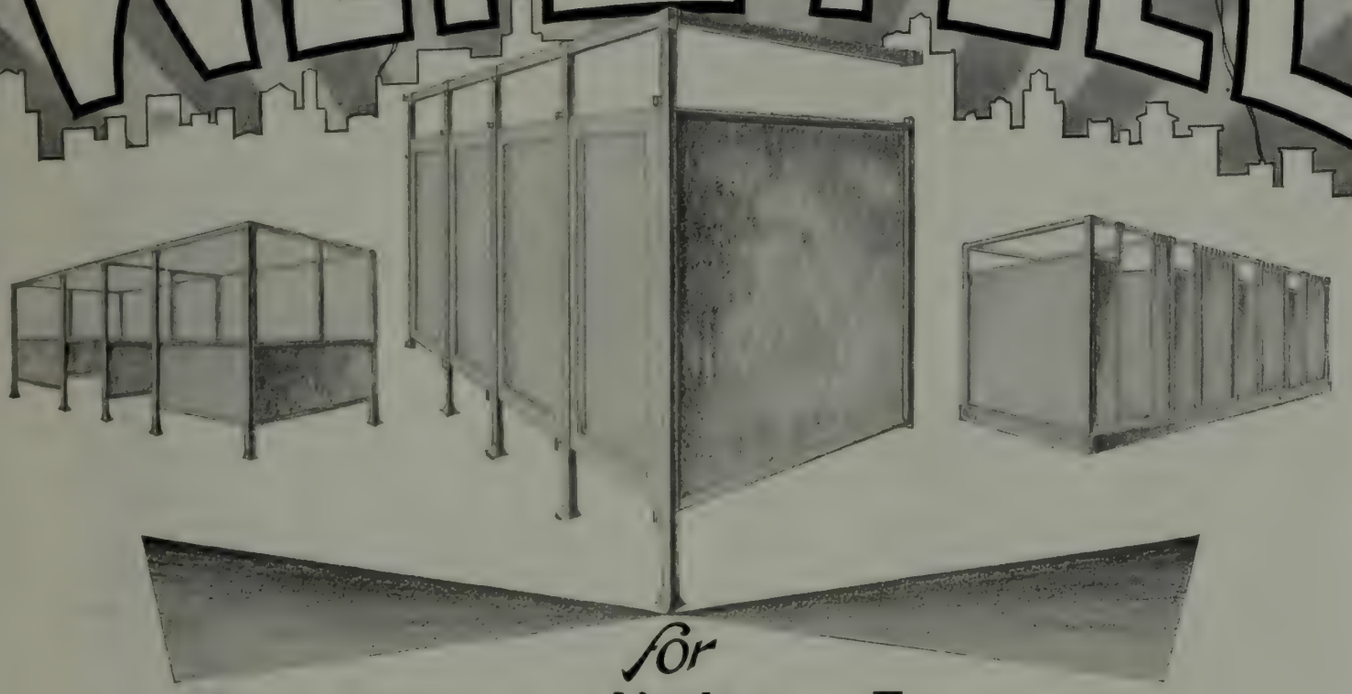
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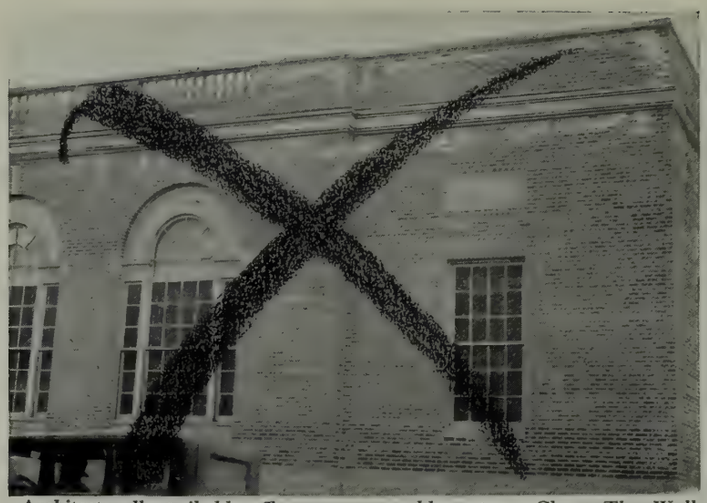
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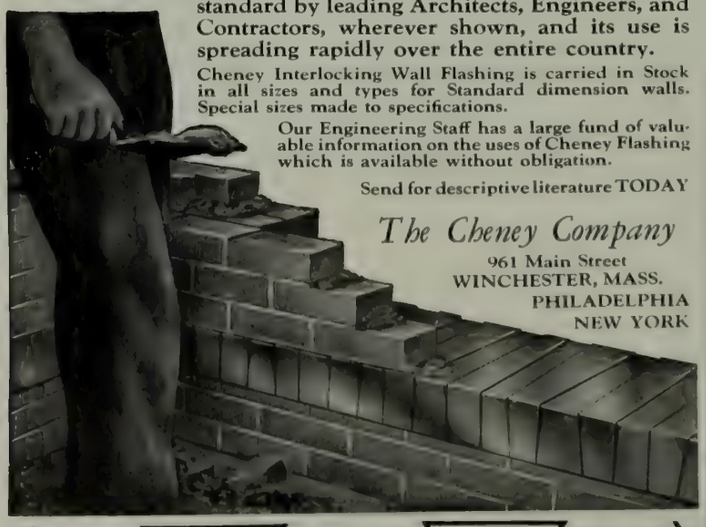
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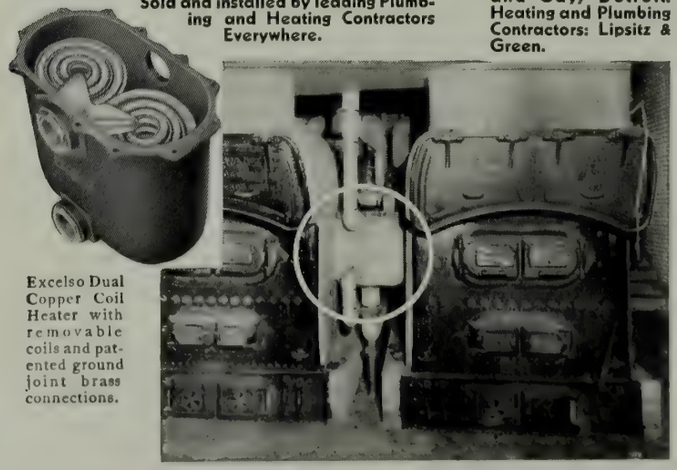
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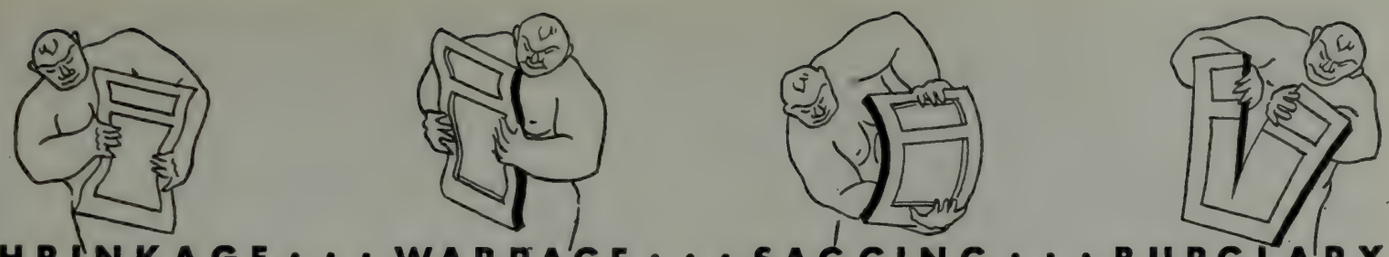
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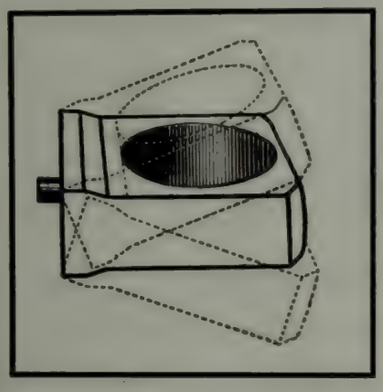
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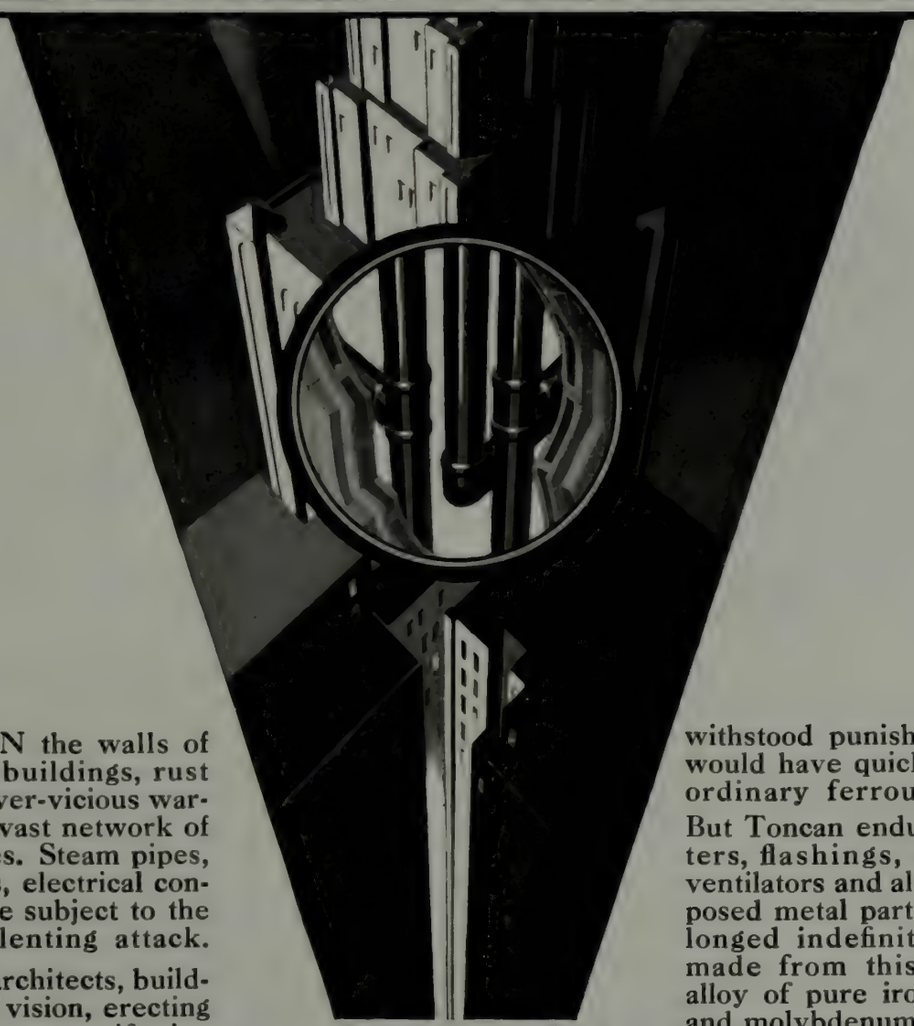
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But Toncan endures. Gutters, flashings, cornices, ventilators and all other exposed metal parts are prolonged indefinitely when made from this durable alloy of pure iron, copper and molybdenum.

Wherever metal must resist rust and corrosion, you can count on Toncan for long life and dependability.

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TONCAN
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CENTRAL ALLOY STEEL CORPORATION
Massillon and Canton, Ohio

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Utilize the knowledge we have acquired in the planning and operation of kitchens in hotels, restaurants, cafeterias, clubs, and hospitals. Our engineering department will gladly cooperate in the designing of typical layouts, this service obligating the architect in no way whatsoever.

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THE Mahon Cast Iron Roof Sump is the simplest, most practical roof drain for any requirement. It is permanent and troubleproof . . . there are no springs, loose rings or bolts . . . it requires no elastic cement or solder for installation. The dome strainer locks in place by a simple turn and may be removed without disturbing the sump bowl or surrounding roofing. Mahon sumps are furnished tapped for 3″, 4″, 5″ or 6″ Std. W. I. pipe thread—see Sweet's for complete information.

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DETROIT, MICHIGAN
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THE ARCHITECTURAL RECORD
119 West 40th Street, New York City

TIME - THE ACID TEST



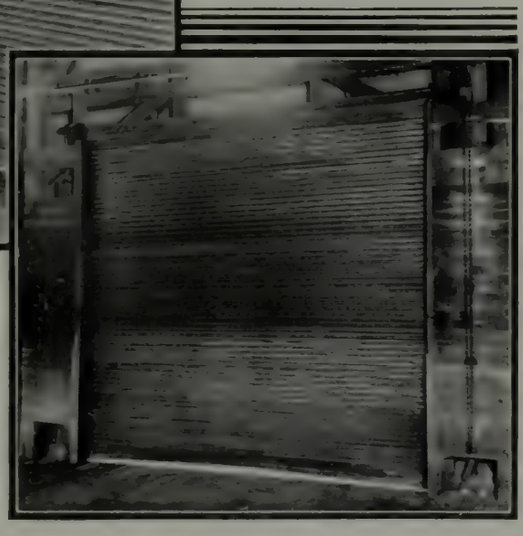
Interior view of the P. C. C. & St. L. R. R. out bound freight house at Columbus. These Kinnear Rolling Doors, photographed Feb. 1930, are giving good service after thirty years' use.

Still on the Job After a Third of a Century's Continuous Service . .

Durability in rolling doors is an extremely important consideration when deciding on equipment of this kind. But durability, plus perfect and uninterrupted performance is even more important.

Photographically all rolling doors are very much alike (the appearance of Kinnear Rolling Doors has been very cleverly imitated). But, only Kinnears have proven their ability to function just as smoothly after thirty years as the day they were installed.

As a rule, the genuine article is not only more satisfactory, but actually cheaper in the long run. Kinnear Rolling Doors are no exception.



A thirty-five year old counter-weighted Kinnear Rolling Door, still in perfect operating condition. Jammed bottom bar, the result of accident, is the only evidence of damage.



The new Kinnear Rolling Door Catalog is mailed free on request. Kinnear Engineering and Estimating Service is available without charge or obligation.

THE KINNEAR MANUFACTURING CO.
401-451 Field Avenue, Columbus, Ohio, U. S. A.

Boston Chicago Cincinnati Cleveland Detroit New Orleans
New York Philadelphia Pittsburgh Kansas City Washington

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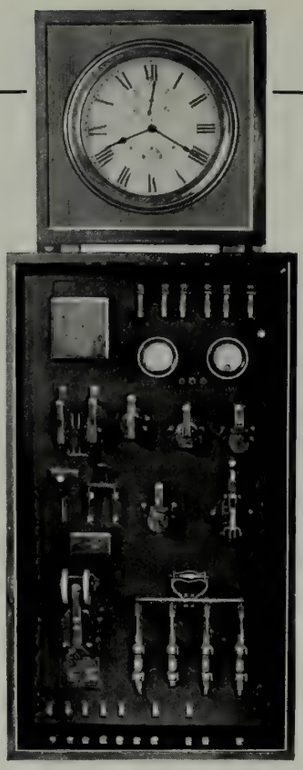


ILLUSTRATION shows Type AEG Emergency Lighting System Control Panel, mounted in steel cabinet with Electric Self Winding Clock for supervision and control of charge of storage battery, which is one of the many Landis features.

Complete specifications for Emergency Lighting equipment will be found in Sweet's Architectural Catalogues, Volume D, pages 5428 and 5429.

LANDIS ENGINEERING & MFG. CO.

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QUALITY ECONOMY LANDIS SERVICE

BATHROOM FURNISHINGS



The Equitable Building, New York—Parker equipped. Trowbridge and Livingston, architects.

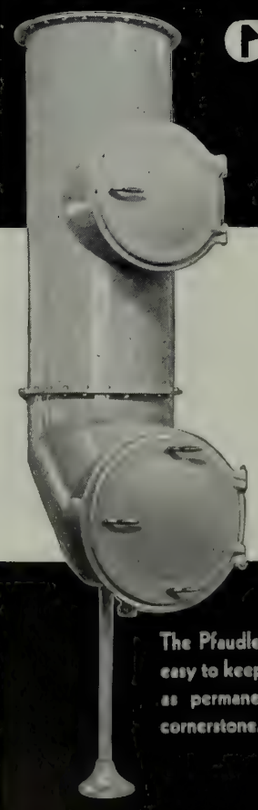
CHARLES PARKER Co. Bathroom Fittings, Accessories, Mirrors, Medicine Cabinets, etc. include every type of fixture and accessory used in the bathroom, and architects may specify them with complete confidence (1) that all equipment desired will be available, (2) that they will be of the highest grade on all scores, (3) that the finish of each article will be perfect and (4) that the date of delivery will be met regardless of how large the order is.

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Manufacturers of Bathroom Furnishings
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New York Office....CHARLES PARKER CO., Inc. 25 MURRAY STREET

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PRACTICAL, durable and sanitary, the Pfaudler Glass Lined Laundry Chute is the choice of modern hospitals and hotels everywhere. Write for Bulletin No. 696.

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ELYRIA, O. SAN FRANCISCO

The Pfaudler Chute—easy to keep clean and as permanent as the cornerstone.

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"Red Metal"
(Solid Bronze)

"Giant Metal"
(Phosphor Bronze)

and

Steel Sash Chains

Have been specified by discriminating architects for over 45 years

See page C2928 Sweet's Architectural Catalogues.
Have you our A1 Sash Chain Catalogue on file?

The Oldest and Best Sash Chain on the Market

THE SMITH & EGGE MFG. CO.
BRIDGEPORT, CONN.
ORIGINATORS OF SASH CHAINS



The beautiful, new Lefcourt-Newark Building
Canal and Commerce, Commerce Court, Facing Broad Street

"Buffalo"

Fans Chosen for the New Lefcourt-Newark Building

PAST performance of Buffalo heating and ventilating equipment in hundreds of buildings throughout the country was convincing enough for the builders of this fine, new building, located in the heart of Newark's business center.

They based their selection on the strength and rigidity of the fans, flexibility of the units, silence of the system and cost of the installation.

Better buildings, better ventilation—Buffalo Fans.

Buffalo Forge Company
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SCHRENNELL BROS., *Heating & Ventilating Contractors*
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"Buffalo" for Heating, Ventilating, and Air Conditioning

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In the classified telephone directory of these cities you will find the name and address of our representatives, qualified theatre lighting experts. Call or write them or us.

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OPPOSITION is rarely encountered by the architect who specifies Bel-Sun-Lite for a theatre. In ten years of manufacturing under our own name we have won the confidence of theatre owners. Most theatres use many Bel-Sun-Lites; many use no others.

We manufacture all lights used in the theatre except decorative wall and ceiling fixtures. Specify these as you wish, and for the remainder merely write, "Bel-Sun-Lite." Our nearest representative will make a survey and furnish a list of the necessary equipment which you merely make a part of the specifications. In this way you provide the maximum of convenience to yourself and satisfaction to your client.

Belson Manufacturing Co.
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VERMONT MARBLE COMPANY
PROCTOR, VERMONT



Figure 237
[Acid Proof One Piece Laboratory Sink with Back

KNIGHT-WARE is GUARANTEED acid proof and corrosion proof throughout its entire body, withstands the action of acids, alkalies, chemicals and all corrosive solutions and gases, weak or strong, hot or cold.

Unusual **strength, toughness** and **durability,** ease of installation and **inexpensiveness** combined with its acid and corrosion proof qualities make Knight-ware ideal for Waste, Drain and Ventilating Lines, Laboratory Sinks, Sumps and similar acid proof equipment.

Catalog and Literature Upon Request

Look us up in Sweet's, pages C3950-3951

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HOTELS
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or wherever soft water should be used, is more economically and efficiently secured with rapid rate upflow zeolite water softeners.

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WATER SOFTENER CORP.
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When you specify

MONEL METAL



John Adams High School, Woodhaven, N. Y. equipped throughout with Monel Metal Window Cleaner Safety Hooks, installed by Ackman Window Safety Devices, Inc. Architect: W. C. Martin, New York, N. Y.

you specify SAFETY, *too!*



Monel Metal Window Cleaner Safety Hook with cast head rolled Monel Metel bolt and accessories as furnished by ACKMAN WINDOW SAFETY DEVICES, INC., New York, N. Y.

THE New York Board of Education has recenty adopted Monel Metal as the standard material for window cleaner safety hooks in all new construction.

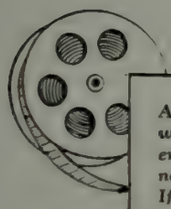
The purely utilitarian aspect of this application bears a significance of more than ordinary interest to architects. It focuses attention on the practical advantages of this high Nickel alloy—on its outstanding dependability under the most arduous service conditions.

In this instance, the choice of Monel Metal was prompted by the prime consideration of safety—protection to life. The job demanded a material of unvarying rugged strength and durability. Immunity to rust and resistance to corrosion were other important factors.

Monel Metal provided the best combination of these essential properties because it has the toughness and strength of steel. It has no coating to chip, crack or wear away. It can't rust and it resists the corrosive attacks of atmospheric gases.

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We shall be glad to send you complete information about the properties and uses of Monel Monel.



An absorbing 2-reel motion picture which graphically portrays the properties and uses of Monel Metal is now available for free distribution. If you would like to show it to your organization write for release details.

MONEL METAL

Monel Metal is a technically controlled Nickel-copper alloy of high Nickel content. It is mined, smelted, refined, rolled and marketed solely by The International Nickel Company. The name "Monel Metal" is a registered trade mark.

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INCo MONEL METAL TRADE MARK





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"The Wood-Preserving Stain for Interior and Exterior Work"

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Warmth Life Attractiveness

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Besides these uses of color, there are the usual ones also—to show center and dimension lines; to indicate piping, hardware, wood, stone, earth, etc.

Your regular dealer can supply you with Higgins' Waterproof Colored Drawing Inks. They are equally adaptable for line and wash work.

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HIGGINS'
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SPECIAL
SOUND-INSULATED
DOOR

Can be fire proofed by Pyrono process.
Prompt deliveries guaranteed
See our catalog in Sweet's.
THE COMPOUND AND PYRONO DOOR CO.
St. Joseph, Michigan
AMERICA'S OLDEST VENEERED DOOR SPECIALISTS

NIEDECKEN

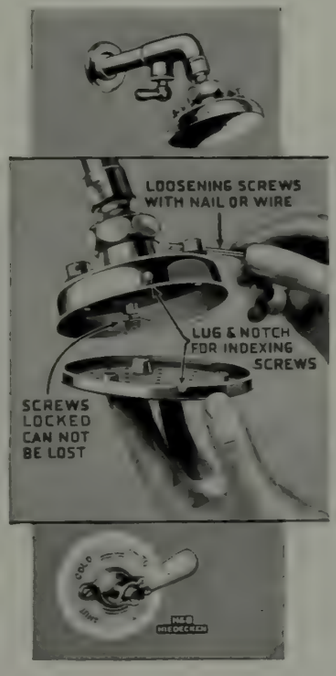
The NIEDECKEN Mixer



Interestingly Descriptive Literature of All NIEDECKEN Shower, Tub and Lavatory Fixtures and Patented Features Sent on Request.

This newly patented NIEDECKEN MIXER for both bath tub and shower, eliminates water waste and prevents scalding and its opposite discomfort. The economic supply control can be set to a predetermined temperature and water can be drawn by the operation of *one handle only* instead of the inconvenient two valve fixture. In action, the NIEDECKEN MIXER is such as to overcome the necessity of gradual regulating water temperature, from cold to hot as regulated by ordinary fixtures. With this NIEDECKEN MIXER the water can be turned to the temperature desired immediately, and maintained throughout the flow. That the NIEDECKEN MIXER is the best device of its kind is attested by the endorsements of many leading national authorities: as most practical, most economical, most correct and satisfactory in every respect.

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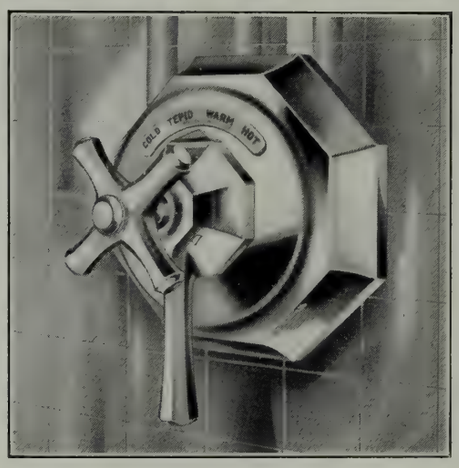
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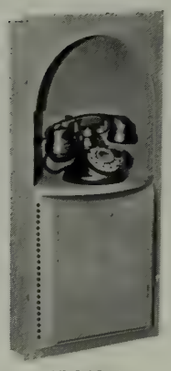
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Easier to install and service. Sturdily built of steel. Fits flush with wall. Lends itself to all beautiful finishes. Folding desk for 'Phone Book. Pilot Light for finding numbers. Bell Push Button for ringing others from distant parts of house. Costs no more than ordinary Cabinets. Send for particulars.

ATLAS METAL WORKS
Plant C-3
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(Patent Applied For)

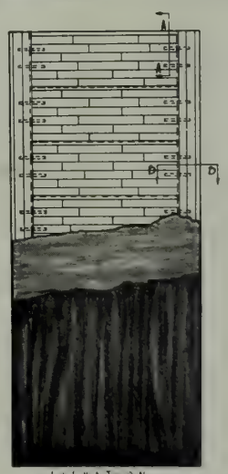


French Provincial Woven Wood Fence

It completes the picture of harmony that should exist between a house, its gardens and its boundaries, regardless of its period or place. The rustic natural simplicity of French Provincial Woven Wood Fences lends itself not only for beauty but for utility and practicability as a screen. It's made of live chestnut saplings woven together with Copperweld rust-proof wire.

The FRENCH PROVINCIAL fence comes direct from France in *full* five foot sections 6'6", 4'11", 3'10", 18", ready to erect. Booklet describing and illustrating various uses sent upon request.

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Let us send you full particulars about HYDE-MURPHY Doors, Mahogany, Cabinet Work and Trim, as well as the Keystone Lock Joint Chamfer construction used on Hyde-Murphy products. Or look us up in the new Sweet's Vol. II, pages 2158-2161 and 2170-2171. Ofhia Partitions? "TAKAPART" has patented advantages. Write for information.

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The advanced construction of this new radiator offers maximum heating efficiency and beautiful design—at moderate cost.

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OUTDOOR floodlights in a complete selection of designs, for: close or long range lighting; concentrated or wide spread of beam; extraordinarily brilliant or normal illumination. Units exactly suited for the job at hand, can be specified . . . Our engineers will be glad to help you solve your outdoor lighting problems.

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ESTABLISHED 1896
THEATRICAL · DECORATIVE · SPECTACULAR
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"BEAUTY WITHOUT INTERRUPTION"

COMPLETELY invisible when the door is closed. Flush doors - clean lines - no undesirable projections.

Manufactured with scientific precision as befits a quality product - yet surprisingly low in cost.

There is a Soss Invisible Hinge for every purpose. See our line in Sweet's Catalogue or write direct to us for our own complete catalogue.

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Established 1908
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For quieter running machinery



1 *Quiet and Clean.* No noise. No oil or grease to leak and collect dust.

2 *Smooth Starting and Running.* The perfect seating action of belts in pulley grooves absorbs the shock of suddenly applied power.

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Specify Dayton Cog-Belt Drives

Dayton Cog-Belt Drives have made a revolutionary improvement in the efficiency of power transmission for building equipment machinery. Pumps, compressors, ventilators, conveyors, and similar machinery will give results with Dayton Cog-Belt Drives that you can't get without them.

Read the list of outstanding points and you'll understand why Daytons are quieter, require less maintenance, are cleaner, and have longer life.

But see for yourself the many advantages of these outstanding drives. Send for a sample section of the belt and a copy of the Dayton Catalog. Mail the coupon today.

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ARCHITECTS' ANNOUNCEMENTS

and Notes in Brief

CALENDAR OF EVENTS
GENERAL ANNOUNCEMENTS

May 20-Oct. 1	Exhibition of modern Architecture and Industrial Arts at Stockholm, Sweden.
May 21-23	American Institute of Architects, Sixty-Third Convention, Mayflower Hotel, Washington, D.C.
May 26-30	Fifth International Congress of Building and Public Works, London.
June 9-July 19	Summer session of New York University School of Architecture.
June 19-30	The Fourth Pan-American Congress of Architects and Architectural Exhibition at Rio de Janeiro.
Aug. 4-9	International Exposition of American Import Trade, Grand Central Palace, N. Y.
September	International Congress of Architects, Budapest.
Nov. 18-29	Art Exhibition, Royal Institute of British Architects, London (9, Conduit Street).
1930	Entries in the competition for the most beautiful bridge in North America are invited. Information can be had from F. H. Frankland, c/o Bridge Committee, American Institute of Steel Construction, Inc., 200 Madison Ave., New York City.
In Oct. 1930	The Department of Architecture of the University of New York will begin a series of lectures on "Promoting and Financing Building Projects."

G. N. Beaumont, architect, P. O. Box 1071, Nairobi Kenya Colony, Africa, wishes manufacturers' catalogues and information. It is very necessary that C. I. F. Mombassa costs be given.

The firm of Coolidge and Hodgdon has been dissolved by mutual consent of the partners. The business will be carried on under the name of Charles Hodgdon and Son, architects, 134 South La Salle Street, Chicago.

Charles Corm and Co., Place Assour, Beyrouth, Syria, offer to represent in their market any architectural product manufactured by Architectural Record subscribers which may be suitable to import into Syria.

William J. Creighton, formerly of La Farge, Clark, and Creighton, has moved to 101 Park Ave., where he will continue the practice of Architecture.

Ollie E. Schrickel and Julian H. Blackwell, architects, have formed a partnership for the general practice of architecture under the firm name of Schrickel and Blackwell, 501½ Second Avenue, Decatur, Alabama.

Lancelot Sukert and G. Frank Cordner, architects, have entered into partnership with offices at 301–303 Architects' Building, Detroit, Michigan.

The new address of The F. W. Dodge Corporation offices in Cincinnati is as follows: 507 Building Industries Building, 622 Broadway, Cincinnati, Ohio.

CORRECTION

On page 245 of the March issue of the Architectural Record, under "Apartment house at Nineteenth Street and Second Avenue, New York City," read *Emilio* Levy, Architect.

PRIZE BRIDGE

The second annual competition for the most beautiful bridge built in North America is announced by the American Institute of Steel Construction. The award will be made to that bridge opened to traffic during 1929 which is selected by the National Jury of Award.

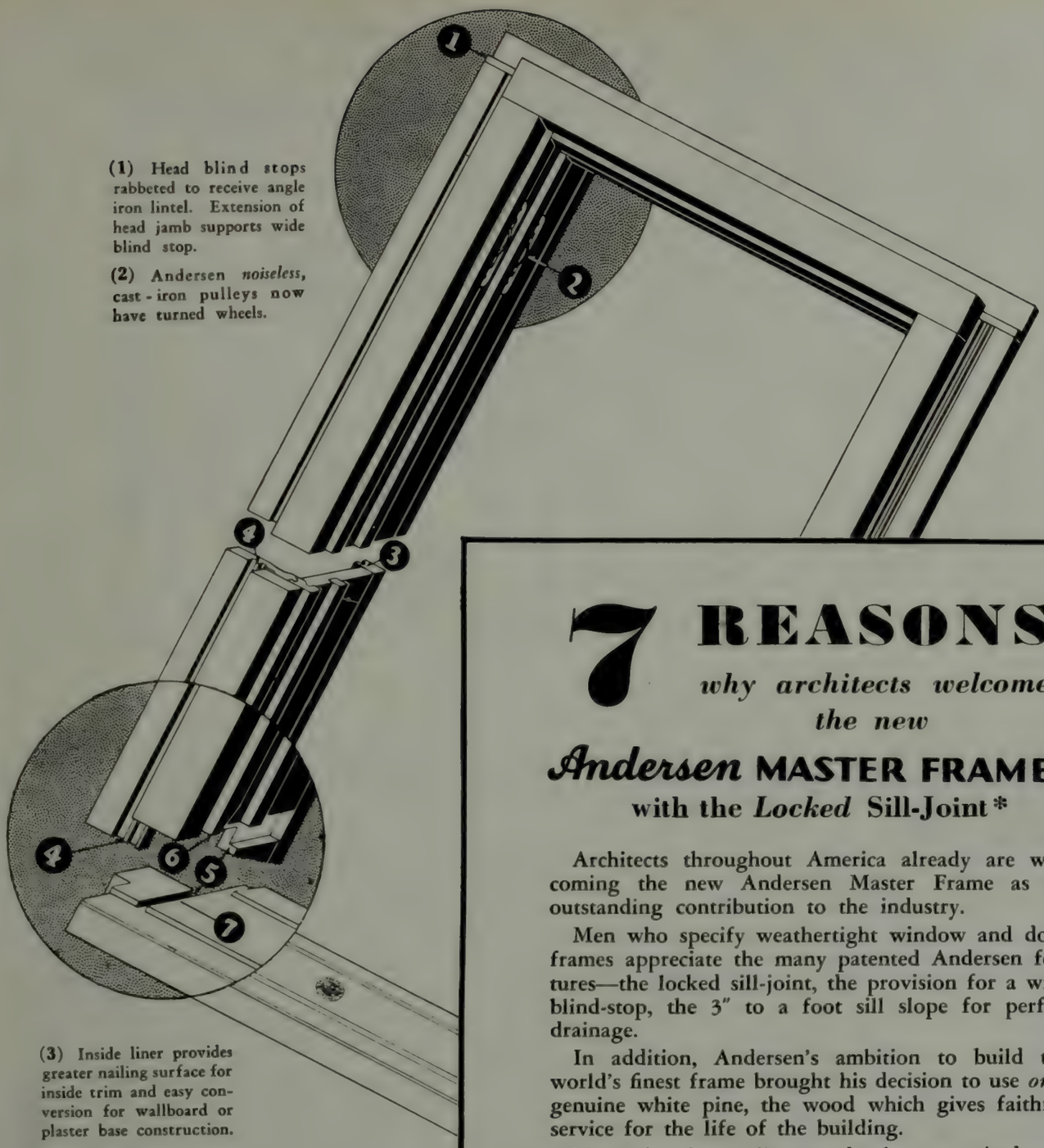
Two awards will be made this year. One for the most beautiful bridge built for less than $200,000, total cost, and the other for the most beautiful bridge costing more than that. Entries are invited from engineers, constructors and owners. Please address F. H. Frankland, c/o Bridge Committee, American Institute of Steel Construction, Inc., 200 Madison Avenue, New York City.

TERRA COTTA DETAIL PLATES

The National Terra Cotta Society, 230 Park Ave., New York City, announces two series of architectural detail plates: *Terra Cotta Standard Construction* and *Moderne Ornament*. The distribution of the two series of plates will be limited to the architects who specifically request them. No broadcast distribution is contemplated.



Design for a Weather Vane by Carl Kudlich, Scarsdale, New York, awarded the first prize of $500 in the competition for a Weather Vane, sponsored by the Art Alliance with prizes offered by the Carrier Engineering Corporation. The weather vane is to be placed on top of a large water tank at their factory in Newark, N. J., and will symbolize the service they offer in the creation of atmospheric conditions within buildings.



(1) Head blind stops rabbeted to receive angle iron lintel. Extension of head jamb supports wide blind stop.

(2) Andersen *noiseless*, cast-iron pulleys now have turned wheels.

(3) Inside liner provides greater nailing surface for inside trim and easy conversion for wallboard or plaster base construction.

(4) Side blind stops channeled for a mortar clinch or caulking.

*(5) Locked sill-joint for leak-proof construction. Also on mullion.

(6) Chamfered blind stop and (7) Three-inch slope to sill for better drainage.

(5) and (6) *are exclusive Andersen features, fully patented.*

7 REASONS

why architects welcome the new

Andersen MASTER FRAMES

with the *Locked* Sill-Joint*

Architects throughout America already are welcoming the new Andersen Master Frame as an outstanding contribution to the industry.

Men who specify weathertight window and door frames appreciate the many patented Andersen features—the locked sill-joint, the provision for a wide blind-stop, the 3" to a foot sill slope for perfect drainage.

In addition, Andersen's ambition to build the world's finest frame brought his decision to use *only* genuine white pine, the wood which gives faithful service for the life of the building.

Note the frame illustrated—the new Andersen Master Frame for brick veneer construction—and observe the many exclusive Andersen features.

There is a new Andersen Master Frame for every type of construction. At your request we will be pleased to mail your copy of Catalog No. 500, showing the new details.

ANDERSEN FRAME CORPORATION
BAYPORT, MINN.

see our COMPLETE CATALOGUE in SWEET'S B 2549-72

SUPERIORITY GUARANTEED by this trade mark

WINDOW and DOOR Andersen FRAMES

Genuine WHITE PINE

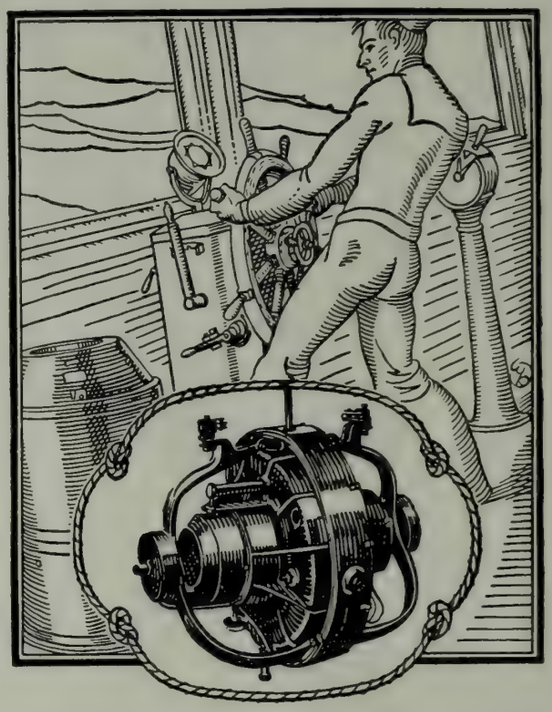
White Pine for PERMANENCE
Weathertight for HOME COMFORT

Andersen MASTER FRAMES

FOR WEATHERTIGHT CONSTRUCTION USE *Andersen* SPECIFICATIONS

STEADY AS A GYRO-COMPASS

Your Business Paper Marks a True Course



HIGH up in the wheelhouse of a ship there spins a gyroscopic compass, pointing ever at True North. With automatic precision it warns the navigator of the slightest deviation from his course. By its aid he steers his ship unerringly across the waste of waters to its destined port.

Just so the printing press, revolving steadily in its great frame, is symbolic of the guiding function of the business paper in keeping business headed straight. Is industry threatened by stormy times? The business paper points the way across an area of uncertainty to the smooth waters of stability. Does an industry veer from its course to follow misleading lights? The business press sounds a warning. Is the ship of business blown off its track by a sudden shift in public demand, or swerved aside by an unexpected change in production or sales technique? The business press points out the course to safety and prosperity.

It is this function of the industrial and merchandising press, no less than its service as a source of news and data, which makes it a power to be reckoned with in business affairs. For the modern business paper is an essential factor in every progressive industry. By its competence in the gathering and presentation of information, it has made itself indispensable. For its independence in the editorial interpretation of that information it has become respected. It is a strong organization, efficiently staffed and capably administered. It commands a sound, paid, audited circulation. Its news and editorial pages are unbiased and unbuyable.

And for these reasons its advertising pages are bought by businesses with a story to tell to its readers.

THIS SYMBOL *identifies an A B P paper . . . It stands for honest, known, paid circulation; straightforward business methods and editorial standards that insure reader interest . . . These are the factors that make a valuable advertising medium.*

THE ASSOCIATED BUSINESS PAPERS, INC.

FIFTY-TWO VANDERBILT AVENUE · NEW YORK CITY

This publication is a member of the Associated Business Papers, Inc. . . . a cooperative, non-profit organization of leading publications in the industrial, professional and merchandising fields, mutually pledged to uphold the highest editorial, journalistic and advertising standards.

Select your floors "à la carte" for the rooms you want to be different

GOOD TASTE, in a room as well as a menu, demands something that is distinctive, different, and original in character. When you design floors "à la carte," you know you'll get just what you want. Your made-to-order floor is assurance that the whole decorative scheme of the room will be planned on a proper basis.

Therein rests the advantage of Armstrong's Cork Tile! Three delightful shades of brown and more than thirty standard tile sizes enable you to design any floor you desire—custom-made to suit the mode of the room you are planning.

Hand-laid, Armstrong's Cork Tile Floors permit design adaptability for almost any type of room or any type of building—school, hospital, public building, yes, even private residence. Today this is most important; the client's appreciation of harmonious beauty accentuates the value of floors made to order.

Virtues of a practical nature are present, too. Armstrong's Cork Tile Floors are naturally quiet. They say "Sh" to traffic noises. They cushion feet and prevent slipping. They are easy to clean. Sanitary, of course. Simple care makes them give many years of satisfying service.

We'd like to tell you the whole story about Armstrong's Cork Tile and its many superiorities for quiet, restful floors. So we suggest that you send for our color-illustrated book, "Custom-Built Floors of Cork." You'll see many interesting design possibilities. And there are important facts about Armstrong's Linotile, another custom-built floor. Armstrong Cork Company, Custom Floors Department, Lancaster, Pa.

Notice how this Armstrong's Cork Tile Floor blends with the decorations of Notre Dame Academy's dining-room, Cleveland, O. This interior was planned by Thomas D. McLaughlin and Associates, Lima, O., architects.



Armstrong's CUSTOM FLOORS

Armstrong's (A) Product

LINOTILE **CORK TILE**

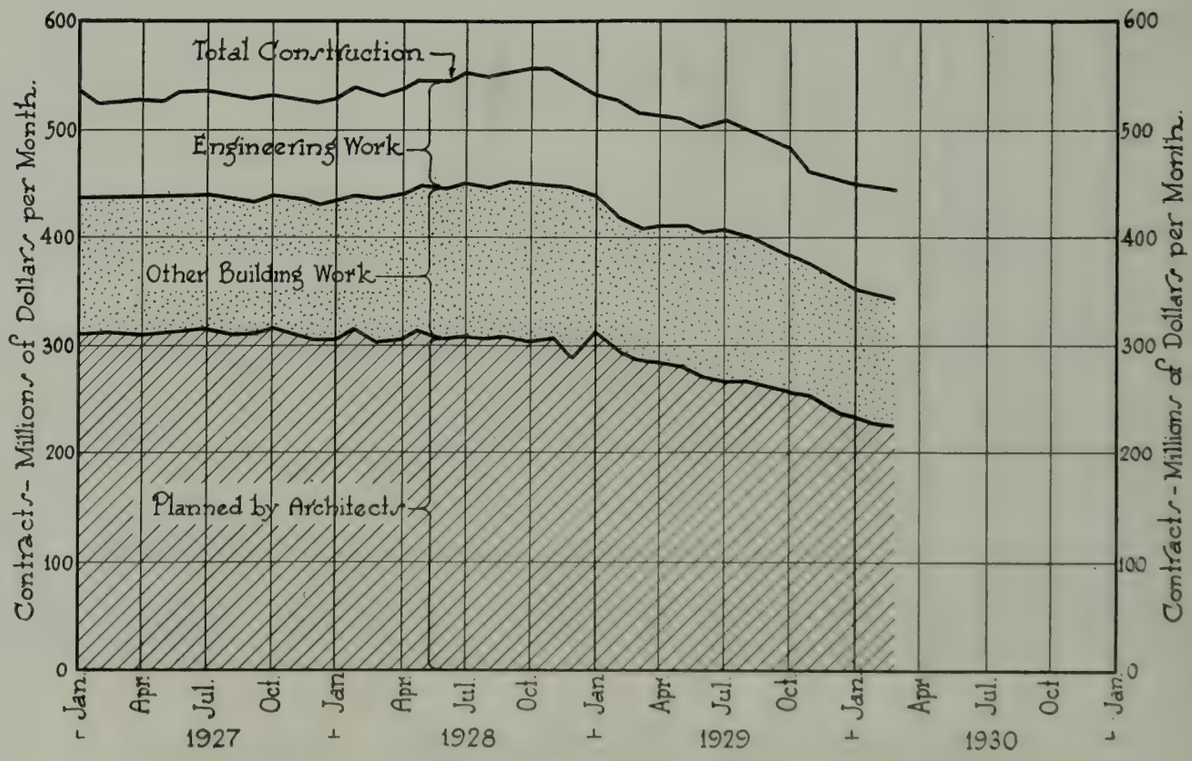
MADE BY THE MAKERS OF ARMSTRONG'S LINOLEUM

CONSTRUCTION STATISTICS

From the records of F. W. DODGE CORPORATION, Statistical Division. The figures cover the 37 states east of the Rocky Mountains and represent about 91 per cent. of the country's construction volume. They include projects amounting to $5,000 and up.

First Three Months, 1930

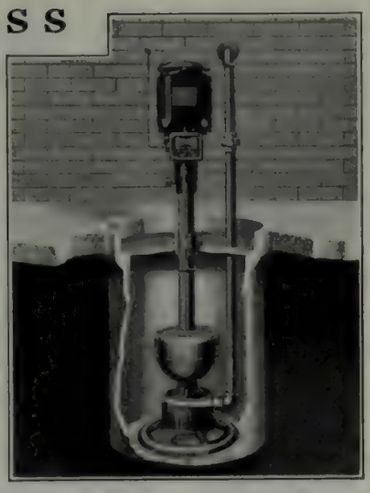
	TOTAL CONTRACTS		WORK PLANNED BY ARCHITECTS		
	Number of Projects	Valuation	Number of Projects	Valuation	Per Cent. of Total
Commercial Buildings	5,729	$206,957,000	2,180	$166,821,700	81
Industrial Buildings	1,324	146,098,100	469	47,165,200	32
Educational Buildings	723	75,598,200	623	73,377,800	97
Hospitals & Institutions	224	39,363,800	172	34,555,800	88
Public Buildings	284	32,336,600	174	28,022,700	87
Religious & Memorial Buildings	406	25,177,000	278	23,653,600	94
Social & Recreational Projects	516	28,489,900	312	24,948,900	88
Residential Buildings	16,250	242,886,700	4,225	141,249,000	58
Total Building	25,456	796,907,300	8,433	539,794,700	68
Public Works & Utilities	3,112	303,239,900	67	11,781,200	4
Total Construction	28,568	$1,100,147,200	8,500	$551,575,900	50
Total Construction, 1st 3 months, 1929	35,883	$1,255,829,300	10,787	$678,681,000	54



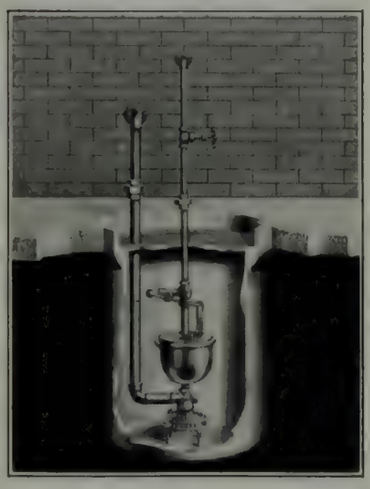
General Trend of Building and Engineering Construction

CONTRASTS IN INDUSTRIAL PROGRESS





Many architects specify these Penberthy Pumps for draining seepage water from basements, elevator pits, piping tunnels, etc.

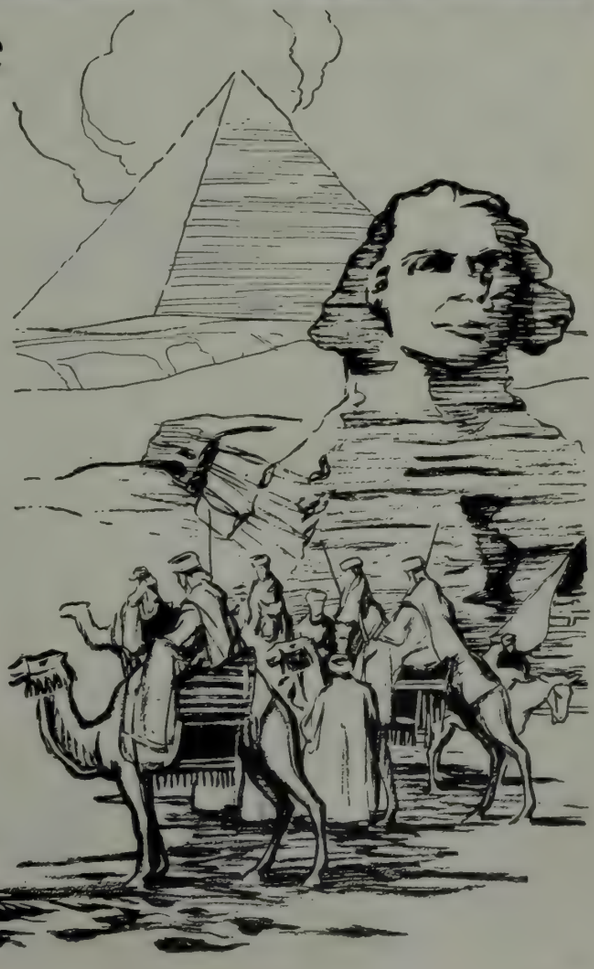


Lifting water from the River of the Pharaohs

ALONG the Nile they call these Shadufs, and they use them for elevating water into the irrigation ditches. At this particular point the Shadufs have to be operated in two stages even though the "operating head" is not more than 15 feet.

Could elevating water be made more difficult than this? One small, compact Penberthy Pump (either an Automatic Electric or Automatic Water Operated unit) could displace this whole installation of Shadufs and still be idle most of the time.

One of the salient advantages of these Penberthy Pumps lies in the fact that they can remain idle indefinitely without their efficiency or smoothness of operation being affected. Corrosion is powerless to deteriorate Penberthy Pumps because they are copper and bronze throughout.



PENBERTHY INJECTOR CO

ESTABLISHED IN 1886 — DETROIT — CANADIAN PLANT WINDSOR, ONT.

PENBERTHY PRODUCTS

·RCA·

CENTRALIZED RADIO

Assures Adequate Radio Facilities



"Essential permanent service feature in modern buildings today," say architects

The many special and exclusive features of the two RCA systems are of interest to most architects. Thorough engineering has made RCA Centralized Radio Equipment remarkably simple, flexible and easy to install. Every item of this new equipment is specially designed, as RCA engineers have found "adapted" units unsatisfactory.

Two systems have been perfected

RCA Centralized Radio has been standardized in two principal types:

1—A single antenna connected with a distribution system to radio receivers in rooms throughout the building. As many as 80 radio sets of any make can be independently operated from this common antenna, by plugging into wall outlets. Additional central antennae may be installed as necessary.

2—Centralized Radio receiving equipment to distribute programs to as many as 5000 rooms throughout a building. The choice of programs from four broadcasting stations may be made available at each loudspeaker, with individual volume control.

For various types of residences

The first system is ideally adapted for apartment houses, dormitories, office buildings, etc., where tenants desire to have their own receiving sets. The second system is particularly designed for hotels, hospitals, sanitariums, schools, passenger ships, etc., where occupants of rooms may enjoy radio programs or phonograph record entertainment from a central control.

Plans and estimates prepared

The Engineering Products Division, RCA Victor Company, Inc., will gladly send descriptive pamphlets, answer inquiries, and prepare plans and estimates for installations of any size.

ENGINEERING PRODUCTS DIVISION, SECTION A
RCA VICTOR COMPANY, INC.
233 Broadway, New York, N. Y.
Representatives in Principal Cities

CATALOGUES IN SWEET'S FOR 1930

More than 1800 manufacturers filed their catalogues in Sweet's Architectural Catalogues for 1930 to give architects the information they want and need for selection and specification purposes. Some of these catalogues were reviewed in this Department of The Architectural Record for March and April 1930 and others are reviewed below. They are typical of hundreds of others which cannot all be reviewed because of space limitations.

Carpets and Rugs

A complete treatise on domestic carpet and rug construction and design is presented in the Mohawk Carpet Mills Catalogue. This exposition of carpet and rug manufacturing includes a glossary of terms used in the carpet and rug trade; how to select carpets and rugs for various uses; a comparison of values of different weaves; problems of shading; the various types of carpets and rugs and detailed descriptions and illustrations of their constructions; color plates and patterns, and instructions relating to the care of carpets. 27 pp. Mohawk Carpet Mills, Amsterrdam, N. Y.

Insect Screens, Metal Furniture, Venetian Blinds

The Watson Manufacturing Co., devote 54 pages in three sections for the exposition of their products. 42 pages are required for a complete catalogue of door and window insect screens. The catalogue discusses fundamental considerations regarding screens, classification, and complete details regarding construction of wood and metal screens and hardware equipment. 2 pages are devoted to metal office furniture and 10 pages to a complete exposition of Venetian Blinds. 54 pp. Watson Manufacturing Co., Jamestown, N. Y.

Metal Office Partitions

Wright Metal, Inc., devote 16 pages to fully describe, illustrate and specify their interchangable type of metal office partitions. Detail drawings, half-tones, color finishes and methods of installing electric wiring offer a complete working catalogue of this product. 16 pp. Wright Metal Inc., Jamestown, N. Y.

Steel Casements and Projected Sash and Doors

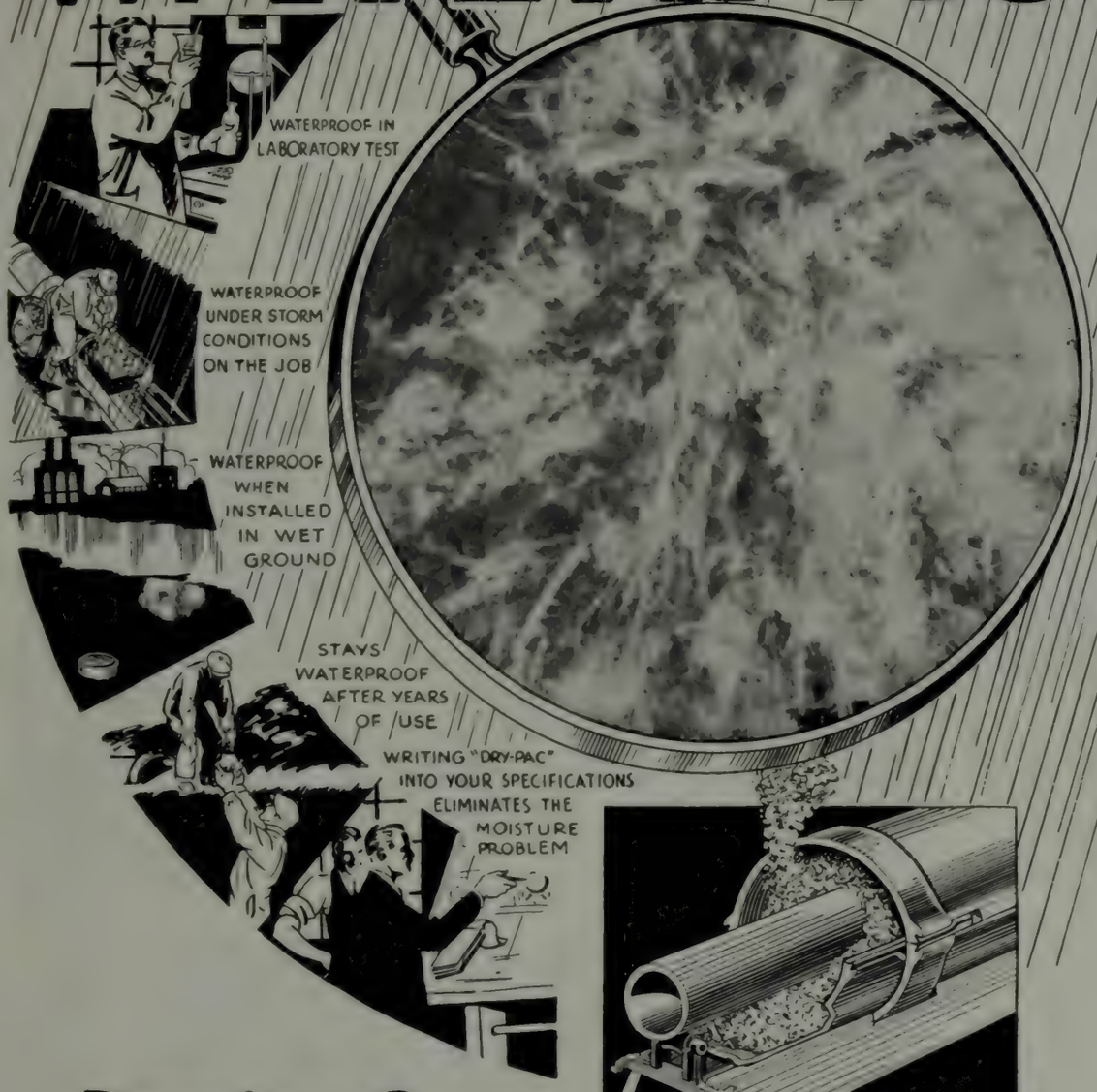
By means of full size and scale details and half-tones of installations the Lundell-Eckberg Mfg. Co., Inc., has presented a 20 page complete working catalogue of custom built and standard steel casements, projected sash and doors. 20 pp. Lundell-Eckberg Manufacturing Co., Inc., Jamestown, N. Y.

Metal Building Specialties

Sanitary metal window trim and reveal lining, metal cove bases, metal casing clips, bulletin board mouldings, chalk troughs, base screeds, picture moulds, corner beads and metal base circuit distribution systems are fully illustrated and described in the 8 page catalogue of Knapp Brothers Manufacturing Co., Chicago, Ill.

(Continued on page 208)

WATERPROOF



Dry-paC has great structural strength and durability. It will not sag.

It maintains its efficiency and waterproof quality after subjection to high temperatures.

Accidentally exposed to flooding for two weeks in a partially completed installation, water penetrated only a few inches into the conduit.

Steam leaks, in test and on the job, have repeatedly and without exception, left this insulation unharmed and dry.

DRY-PAC

Pat. Applied for

Insulating Filler for Underground Conduit

ENGINEERING thought regarding the construction and the insulation of underground steam pipes has been profoundly changed by the development of Dry-paC—a product of Ric-wiL engineering.

For this absolutely waterproof material—besides showing remarkable insulating efficiency—removed the last danger of moisture, heretofore a constant threat against the success of underground lines.

"Closed Construction" which produces efficiencies from 92% to 94% may now be had with Ric-wiL Conduit—the tile housing of the steam pipes filled with Dry-paC and the ends sealed. The heat is bottled up tight.

The cost of insulating steam mains in Ric-wiL Conduit, "closed construction" is in line with ordinary types of conduit showing much lower efficiencies. Complete information, including samples of Dry-paC for testing, sent promptly on request.

THE RIC-WIL COMPANY
1562 Union Trust Bldg., Cleveland, Ohio
New York Boston Baltimore Atlanta St. Louis Chicago

Originators *of* Waterproof Conduit Filler



RIC-WIL

UNDERGROUND CONDUIT



This is the New Yorker Hotel
—the largest in New York City, having forty-three stories. The architects were Sugarman and Berger, the structural engineers were Lange and Naska, and the general building contractor was Mack Kanner.

The services rendered by Robert W. Hunt Company in connection with this building consisted of shop inspection of structural steel and supervision of its erection.

This, by the way, is only a small part of the complete service we are equipped to render, all based on the double check system devised to afford a thorough safeguard against poor materials or the incorrect use or combination of good ones.

See Sweet's A 4

STEEL AT SHOP AND FIELD
CEMENT : : CONCRETE
CONCRETE SUPERINTENDENCE

The ROBERT W. HUNT COMPANY • Engineers
Inspection Tests
CHICAGO
ALL LARGE CITIES

CATALOGUES IN SWEET'S FOR 1930—Continued

White and Colored Glazed Wall Tile

An interesting display showing full range of colors and patterns for floor and wall tile for bath rooms and other uses make up a comprehensive catalogue of this widely used product. 4 pp. The National Tile Company, Anderson, Ind.

Quarry Tiles for Floor and Wall

The United States Quarry Tile Co., require 16 pages to supply complete information in the form of descriptions, dimensioned illustrations of installations of Romany Tiles for floors and walls. 16 pp. United States Quarry Tile Co., Parkesburg, W. Va.

New Uses for Slate

The decorative qualities of Vermont colored slate is interestingly brought out in the catalogue of the Vermont Structural Slate Co., Illustrations of full color range, patterns, descriptions and general notes on the use of slate form a complete catalogue. One page is also devoted to the exposition of structural slate for stair treads, wainscoting, urinal stalls and other uses. 7 pp. Vermont Structural Slate Co., Fair Haven, Vt.

Metal Weatherstrips

The advantages in the use of metal weatherstrips for wood and metal windows and doors and full sized details relating to installations are fully set forth in the 9 page catalogue of the Monarch Metal Weatherstrip Corp. 9 pp. Monarch Metal Weatherstrip Corp., St. Louis, Mo.

Stained Shingles

The Weatherstrip Stained Shingle Co., Inc. are represented in Sweet's File on 3 pages. Data relating to stained shingles for side walls and roofs is given including specifications and illustrations. 3 pp. Weatherbest Stained Shingle Co., Inc., North Tonawanda, N. Y.

Structural Slate

The Structural Slate Company devotes 18 pages to complete descriptions relating to the use of slate for flagging, flooring, roofing, shower stalls, toilet partitions, stair treads, window sills, saddles, bases, etc. An interesting feature is a description of "Structoslate" finished in white or colors. 18 pp. The Structural Slate Co., Pen Argyl, Pa.

Roof and Floor Drains, Incinerators and Swimming Pool Drains

The Josam Manufacturing Co., is represented in Sweet's Architectural Catalogues on 11 pages in 3 classifications. 8 pages are devoted to an exposition of roof and floor drains, 2 pages to incinerators and 1 page to swimming pool drains. 11 pp. Josam Mfg. Co., Cleveland, Ohio.

(*Continued on page 210*)

Telephones . . . placed Where they will Contribute most to Ease and Comfort



In the residence of Mr. Howard F. Smith, Provencal Road, Grosse Pointe, Michigan, there are seven telephone outlets at convenient locations. They include one in the garage, and one in the children's wing of the house. RAYMOND CAREY, Architect, *Detroit, Mich.*

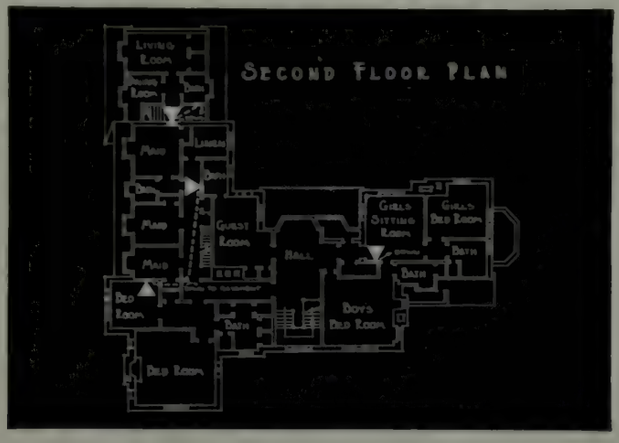
A FEW YEARS AGO a one-car garage . . . one bathroom . . . one telephone . . . were considered sufficient, even for a fairly large residence. Today's requirements are different. *Convenience* has become a dominant note in the design and the appointments of a home.

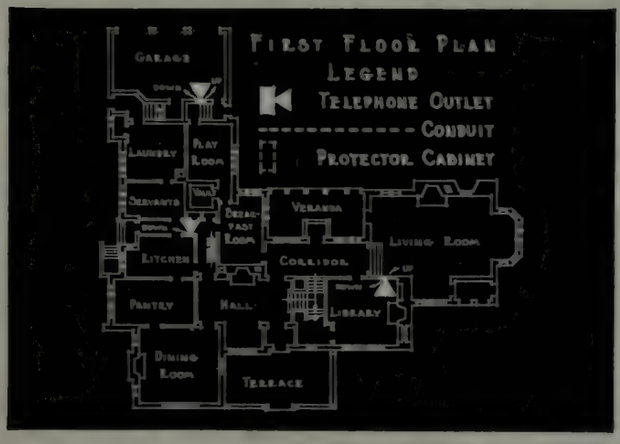
People want telephones in all the important rooms, placed where they will contribute most to ease and comfort. Many architects provide for this in their plans for new and remodeled residences by specifying conduit to those locations where telephones may be needed, initially and in the future.

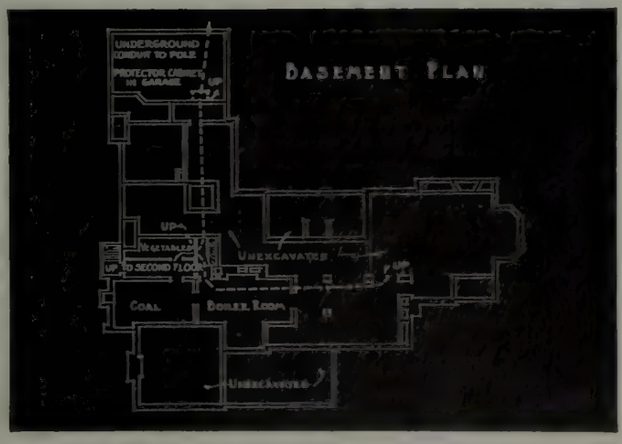
Telephones can then be installed in as many of these locations as the occupant chooses, and the remaining outlets assure flexibility in expanding or re-arranging the service as may be desired.

The improved appearance resulting from the concealment of wires within the walls and floors is a feature much appreciated by home owners.

Representatives of the local Bell Company will gladly confer with you and your clients in planning telephone arrangements. No charge is made. Just call the Business Office.









Pacific Telephone & Telegraph Building, San Francisco, Calif. J. R. Miller and T. L. Pflueger, Architects

"MODERNE"
means
TERRA COTTA
which offers the greatest freedom in developing new ORNAMENT.

NATIONAL
TERRA COTTA
SOCIETY
230 PARK AVENUE
NEW YORK

CATALOGUES IN SWEET'S FOR 1930—Continued

Casement Windows and Decorative Lead Work

Henry Hope & Sons Inc. require 8 pages in two classifications of 4 pages each to illustrate casement windows and interesting and original designs for ornamental lead work for gutters, leaders, leader heads, etc. Henry Hope & Sons Inc., New York, N. Y.

Built-up Roofing

Built-up roofs for flat and pitched roofs and for 10-year and 20-year bonds are fully described and methods of application for various conditions illustrated in 10 pages. 10 pp. International Combustion Tar and Chemical Corp.

Structural Insulation

Masonite is a manufactured board made entirely of wood fibre. Its use as a plastic base, for roof insulation, sound deadening, sheathing and other uses of Masonite is fully described and illustrated in 13 pages. 13 pp. Masonite Corp., Chicago, Ill.

Bath Room Accessories and Closet Equipment

Sweet's idea of complete catalogue data is fully exemplified in the exposition of Hoegger, Inc., bath room accessories on 44 pages and closet equipment on 2 pages. Complete installation data, illustrations, descriptions and prices for interesting features of these catalogues. 46 pp. Hoegger, Inc., Jersey City, N. J.

Bath Room Accessories

An interesting feature of the 25 page complete catalogue of the Fairfacts Co's. catalogue of bath room accessories is the inclusion of suggested equipment for various types of buildings, such as apartment building, hotels, private houses, etc. 25 pp. The Fairfacts Company, Inc., New York, N. Y.

Controlled Heating Equipment

Controlled heating equipment by the use of venting valves, modulating valves, return line valves, damper regulators, thermostatic valves, economy pumps and other specialities is fully described and illustrated on 60 pages by the Hoffman Speciality Co. 60 pp. Hoffman Speciality Co., Inc., Waterbury, Conn.

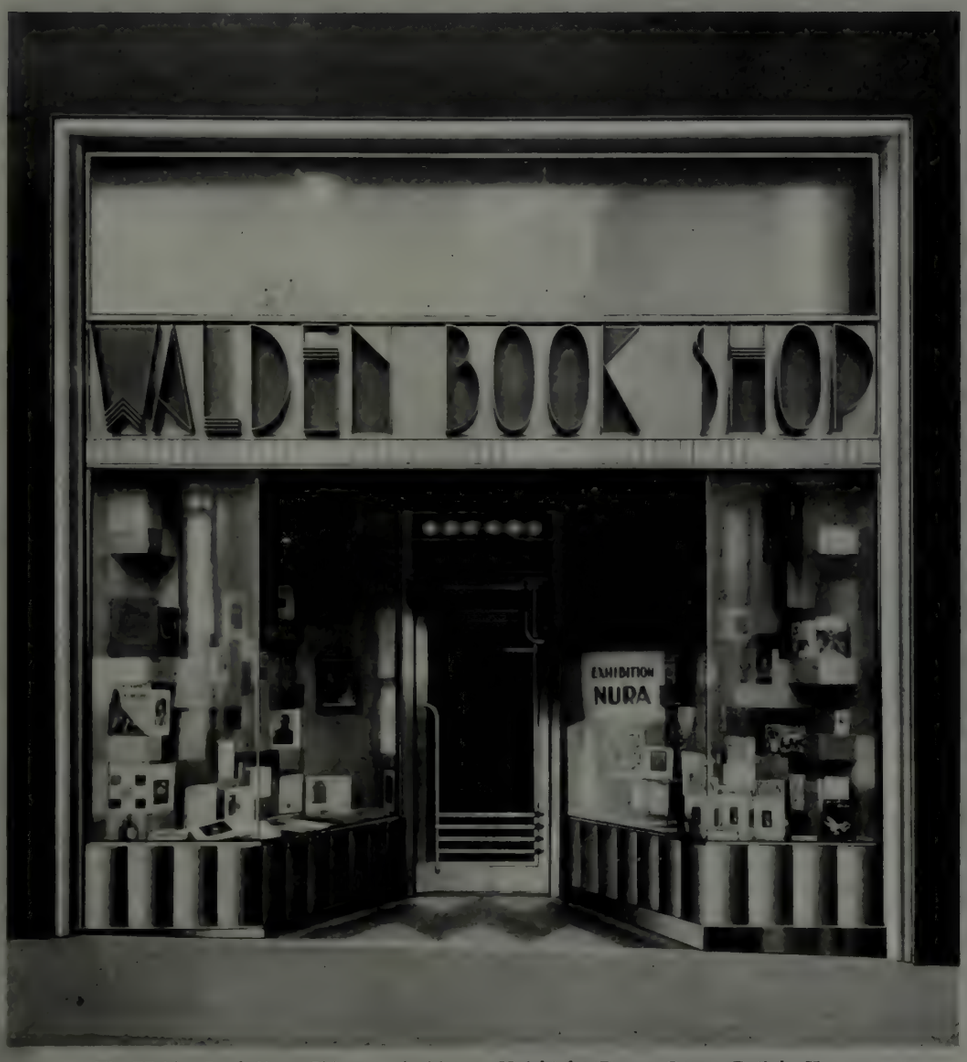
Elevator Door, Fire Door and Garage Door Equipment

The importance of furnishing complete technical data to architects is exemplified in the catalogues in Sweet's File of the Richards-Wilcox Mfg. Co., 41 pages are devoted to garage door hangers, 24 to elevator door equipment and 1 to fire door equipment. 66 pp. Richards-Wilcox Mfg. Co., Aurora, Illinois.

Oil Burners

The Silent Automatic Corp. devotes 8 pages to a complete description of the use of the oil burner for domestic heating purposes. Diagrams of installation, specifications and other interesting data are included, 8 pp. Silent Automatic Corp., Detroit, Michigan.

STORE FRONTS



The Walden Book Shop, Chicago. Architects—Holabird & Root. Custom-Built by Kawneer.

For excellence of workmanship, true reproduction of design and sound construction we advocate the fabrication of store fronts at our factory. A corps of skilled workmen trained by an institution with twenty-five years' experience in store front building is your assurance of satisfaction. Furnished in Bronze, Aluminum Alloy or Copper.

Kawneer
BRONZE
STORE FRONTS

SEE OUR CATALOG IN THE 1930 SWEET'S

THE KAWNEER COMPANY, MANUFACTURERS OF BRONZE STORE FRONTS, WINDOWS AND DOORS
NILES, MICHIGAN. Subsidiary, BERKELEY, CALIF.

BRANCHES

Atlanta, Ga.	Cleveland, O.	Detroit, Mich.	Milwaukee, Wis.	Omaha, Nebr.
Baltimore, Md.	Cincinnati, O.	KansasCity, Mo.	NewOrleans, La.	Philadelphia, Pa.
Boston, Mass.	Charlotte, N. C.	Louisville, Ky.	NewYork, N. Y.	Pittsburgh, Pa.
Buffalo, N. Y.	Chicago, Ill.	Memphis, Tenn.	Niles, Mich.	Utica, N. Y.

SEE OUR EXHIBIT AT ARCHT'S SAMPLE CORP. NEW YORK CITY

WINDOWS



SEALAIR IN-SWINGING

This window is weather-proof when closed and draft-proof when opened. Both sides of all sashes can be washed from the interior. It will not rattle, and can be operated with ease. The stationary bar between lower and middle sash makes it a safety window. Made in Bronze, Aluminum Alloy or Steel.

Send for complete description, specifications and F.S. details.

THE
Kawneer
COMPANY

Niles, Michigan Subsidiary: Berkeley, Calif.

CLASSIFIED DIRECTORY OF ADVERTISERS

Alphabetical Index to Advertisers, Page 228

After reviewing advertisements in this issue—use Sweet's Architectural Catalogues for 1930 for catalogue and specification information on the products of the most of the manufacturers.

Acid Proof Chemical Stoneware
Knight, Maurice A.

Acoustical Installation—Armstrong Cork & Insulation Co.
Guastavino, R., Co.

Acoustics
Armstrong Cork & Insulation Co.
Boston Acoustical Eng. Division of Housing Company
Johns-Manville Corp.

Air Compressors
Westinghouse Traction Brake Co.

Air Conditioner
Airway Electric Appliance Corp.
American Blower Co.
Lewis Corporation

Aluminum
Aluminum Co. of America

Anchors—Concrete
Bulldog Floor Clip Co.

Arc Welding—Lincoln Electric Co.

Architectural Supplies
Higgins, Chas. M., & Co.

Artstone—Rackle, George, & Sons Co.

Asbestos—Johns-Manville Corporation

Baking Machinery
Read Machinery Co.

Balances, Sash—See Sash Balances

Basement, Windows—Steel
Detriot Steel Products Co.
Truscon Steel Company

Bathroom Accessories
Parker Charles Company

Beads—Corner Metal
Milwaukee Corrugating Co.
Truscon Steel Company
Wheeling Corrugating Co.

Beams, Angles, Channels, Etc.
Carnegie Steel Company
Jones & Laughlin Steel Corp.

Belts—Dayton Rubber Mfg. Co.

Blackboards—Weber Costello Co.

Boiler and Pipe Covering
Johns-Manville Corporation
Ric-wiL Company

Boilers—American Gas Products Co.
American Radiator Co.
Bryan Steam Corp.
Heggie-Simplex Boiler Co.
Pierce, Butler & Pierce Mfg. Co.
Smith, H. B., Company, The, Inc.

Bolts—Door—Corbin, P. & F.

Brass and Bronze
See "Ornamental Metal"

Brass and Copper
See "Copper and Brass"

Brick—Finzer Bros. Clay Co.

Bridges—Steel—American Bridge Co.

Builders—Stone & Webster, Inc.

Buildings—Steel
Carnegie Steel Company
Nat'l Assoc. of Flat Rolled Steel Mfrs.

Butts—Corbin, P. & F.
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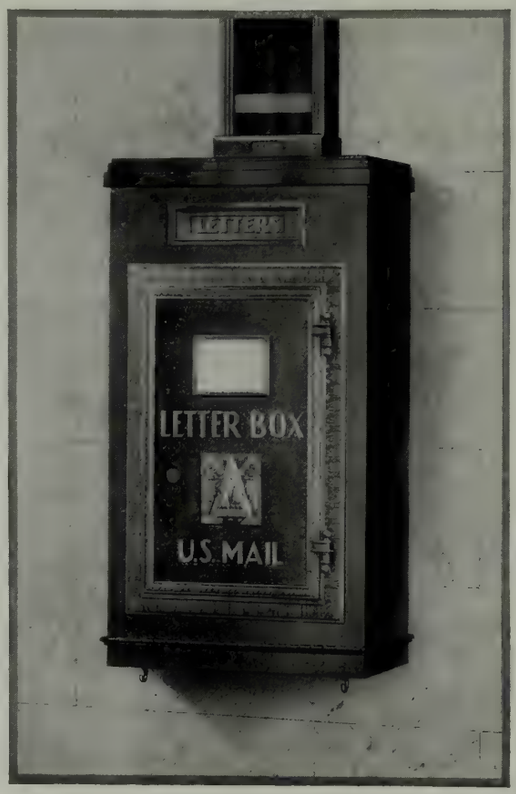


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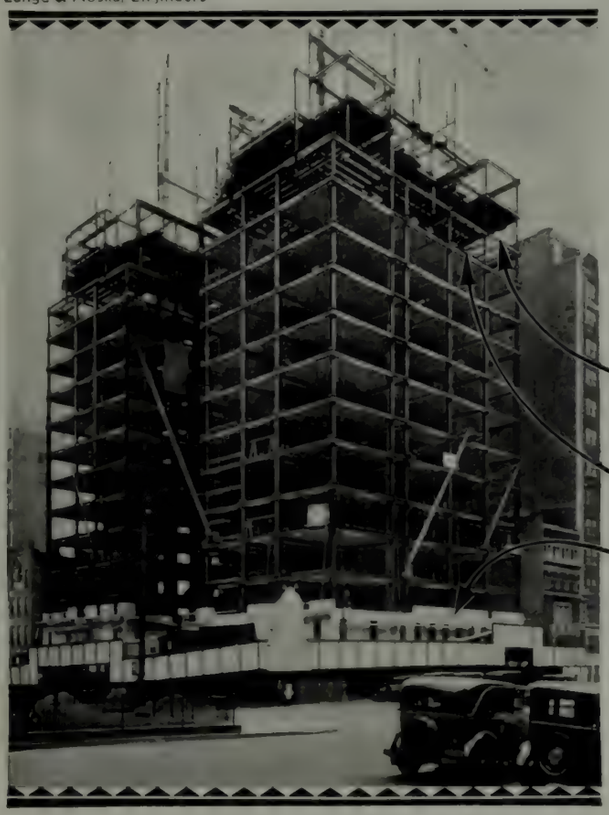
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Photograph of 895 Park Avenue, New York, under construction by Thomas O'Reilly & Son, Inc. with

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1. Steel being bolted.
2. Steel riveted to here and Gypsteel Floors installed.
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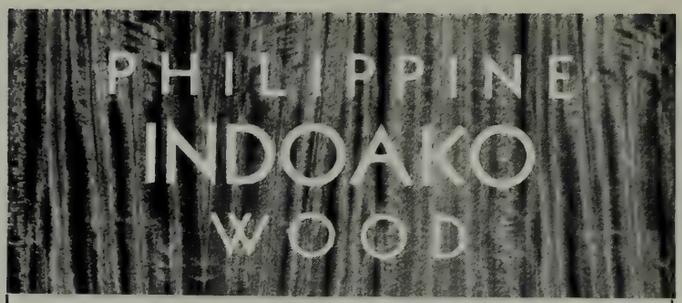
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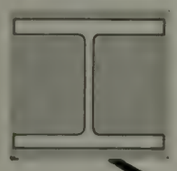
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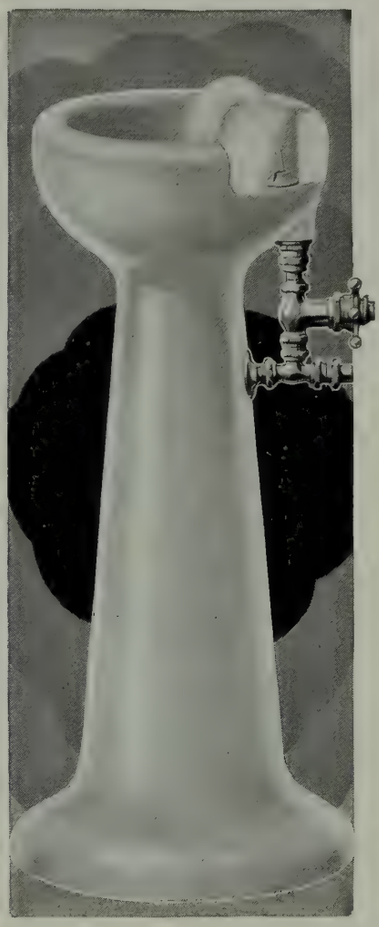
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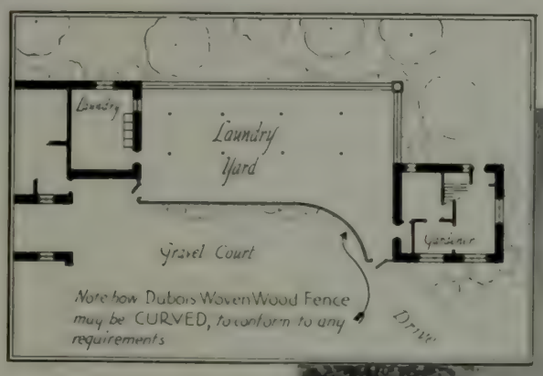
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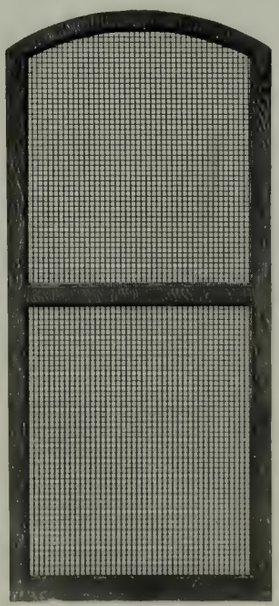
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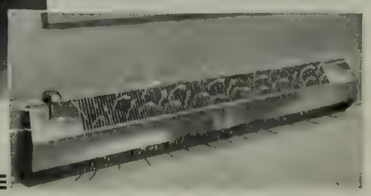
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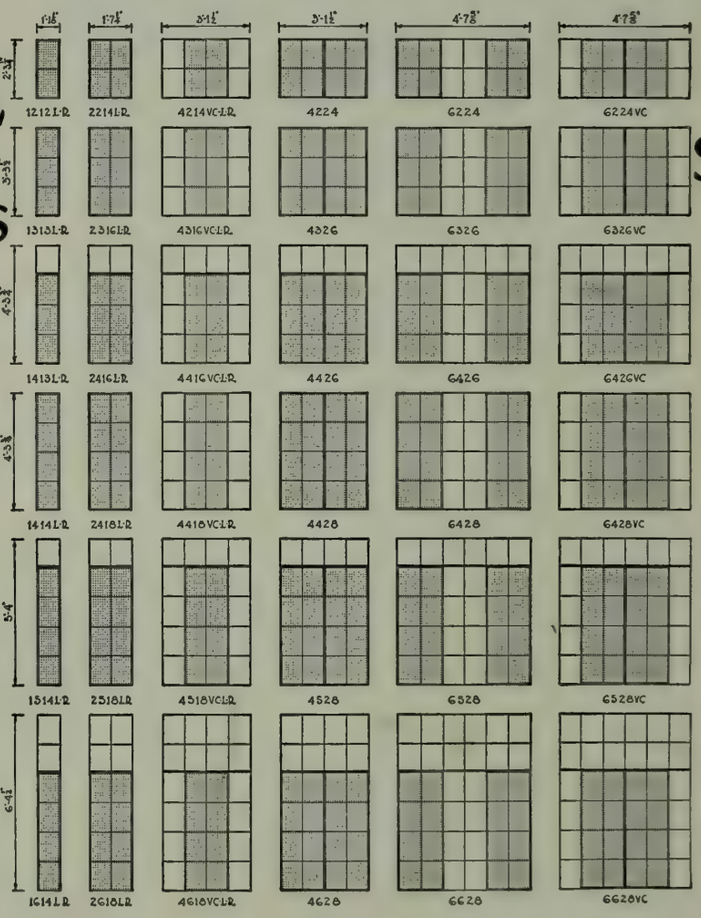
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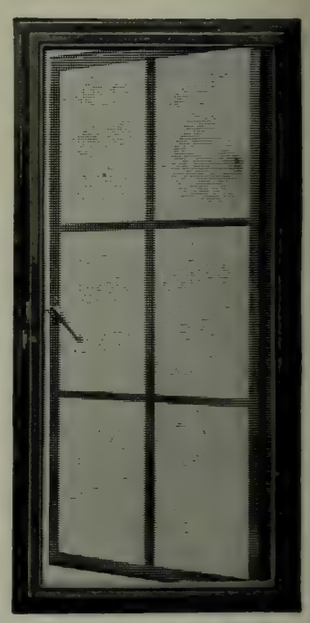
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THE ARCHITECTURAL RECORD

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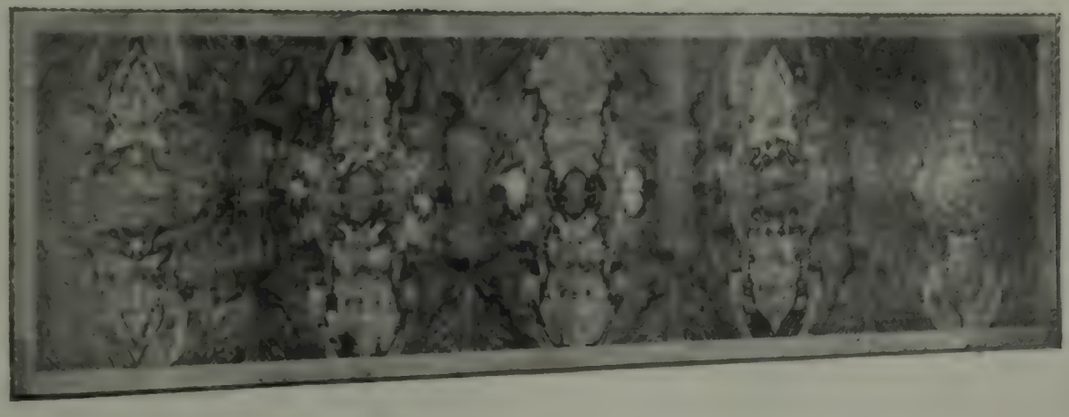
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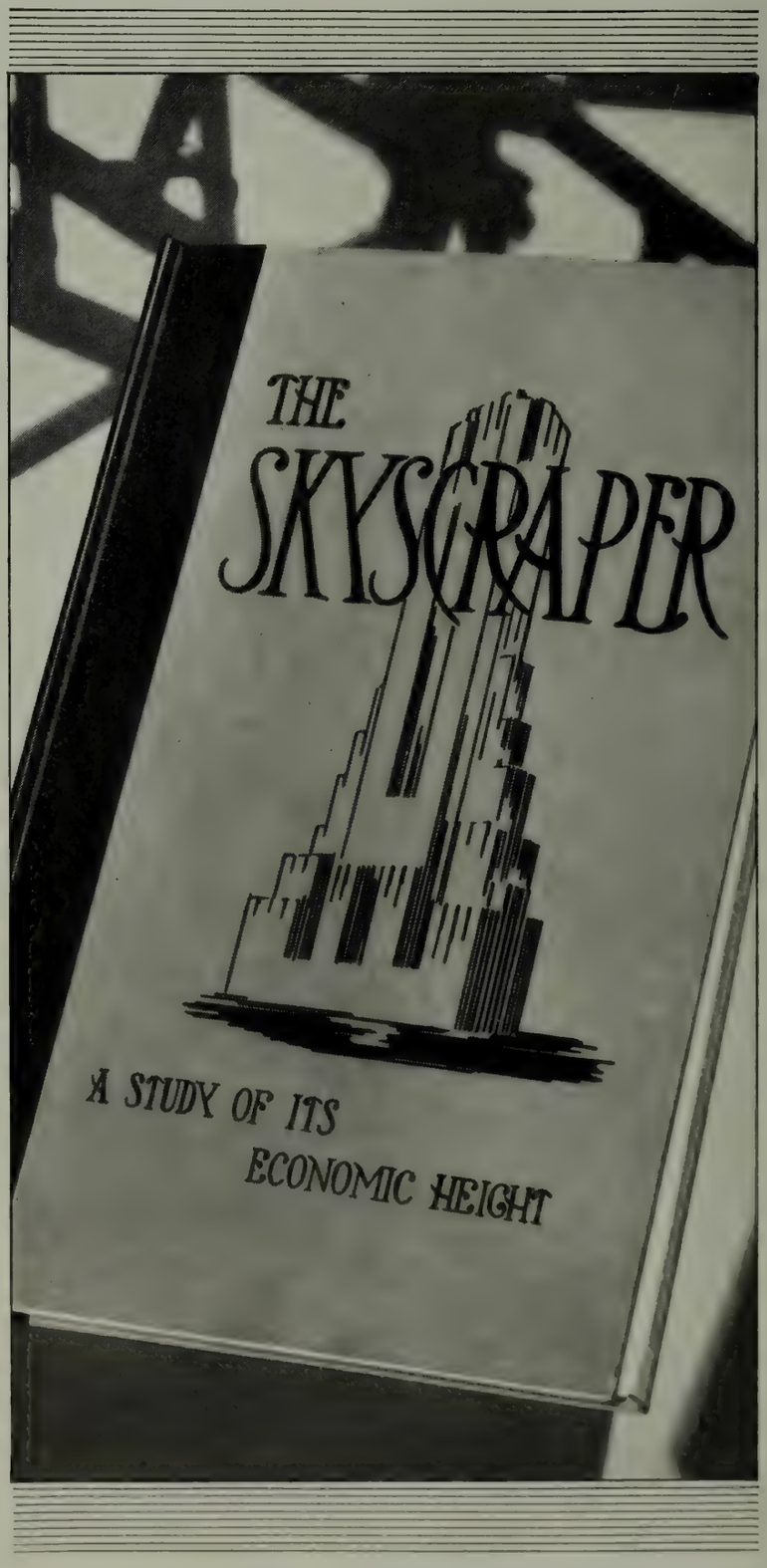
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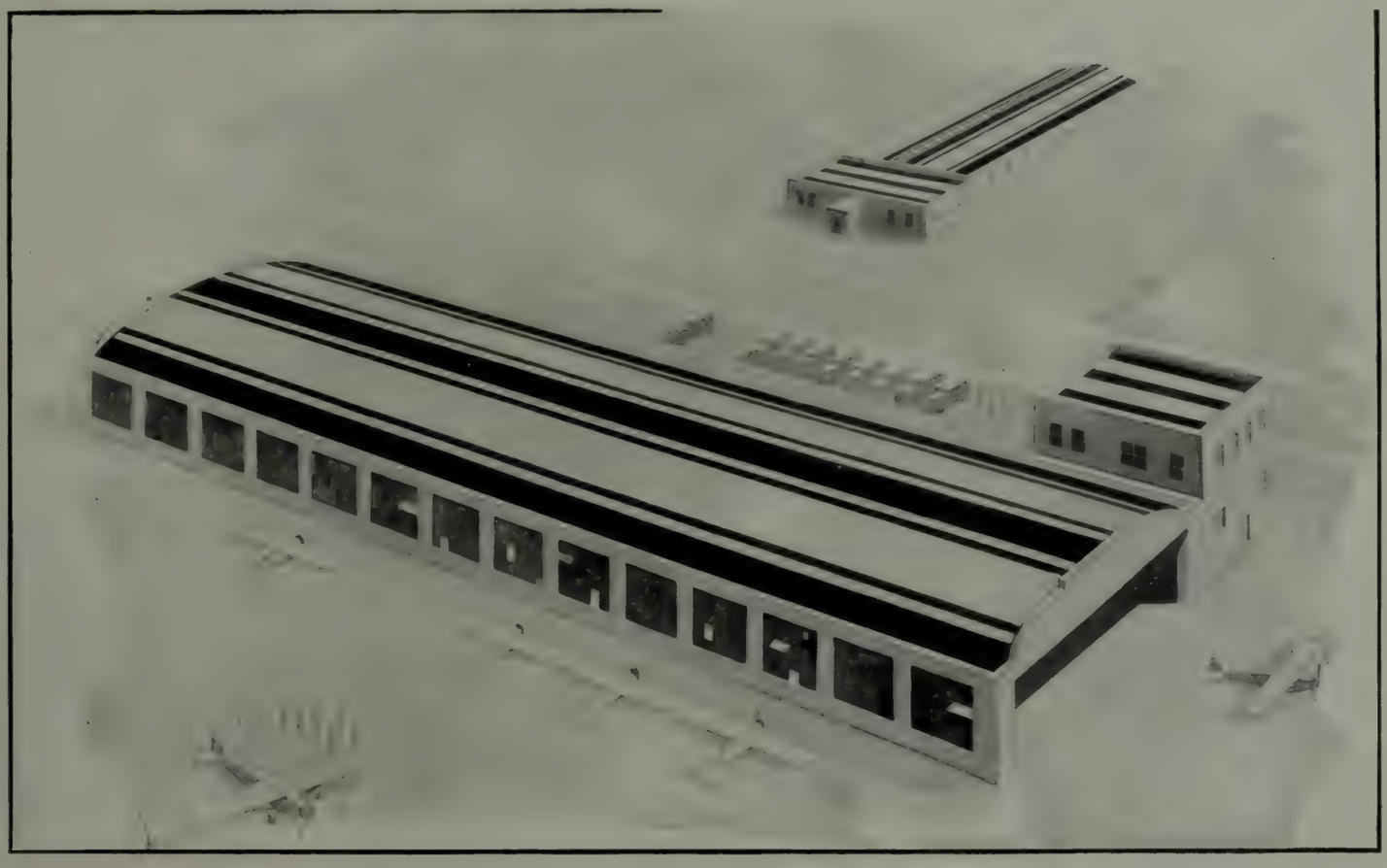


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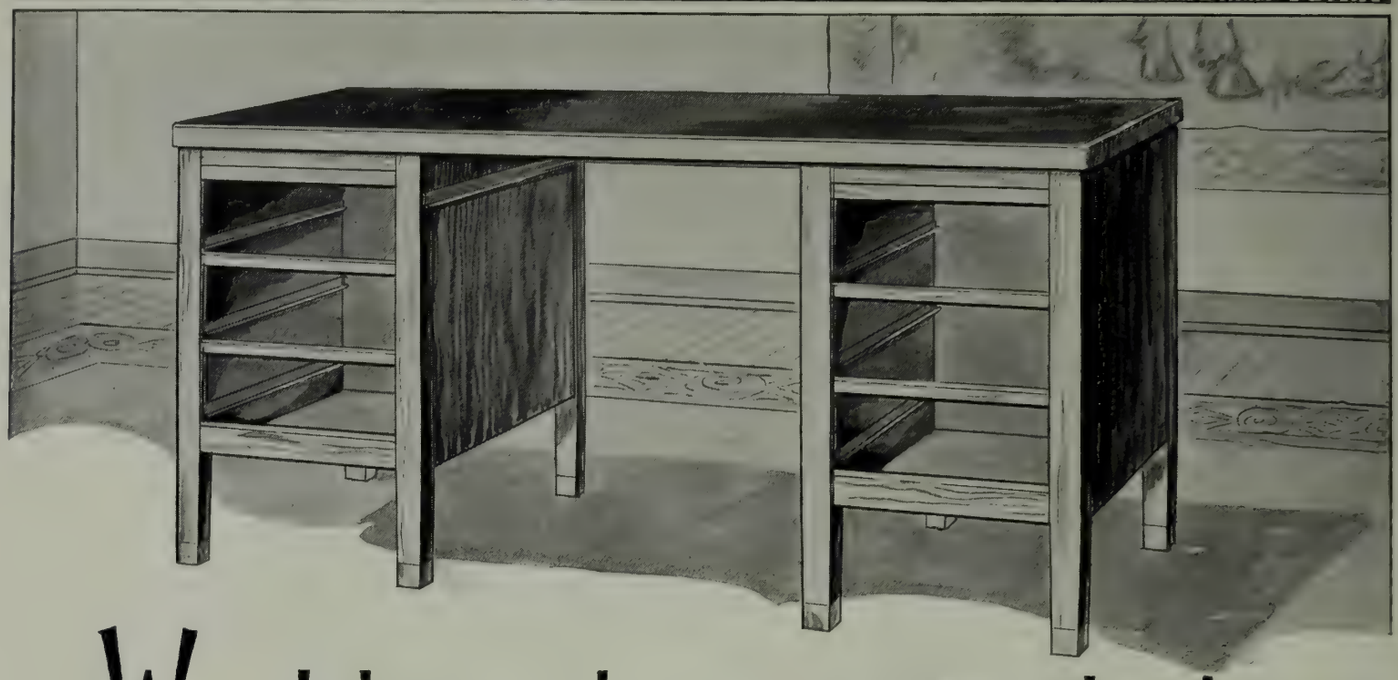
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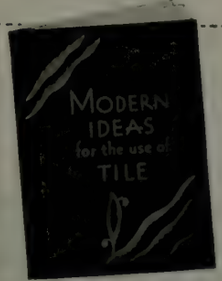
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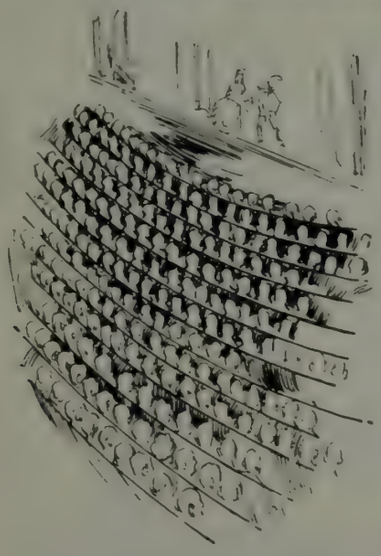
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An exterior view of the State Trade School, Hartford, Conn.

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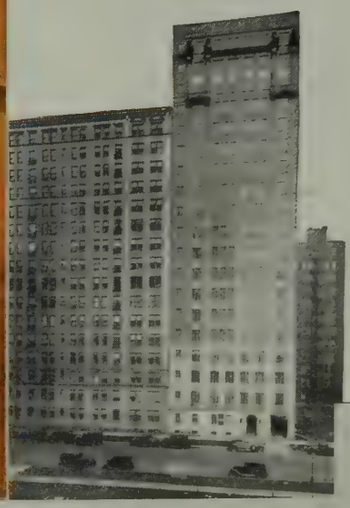
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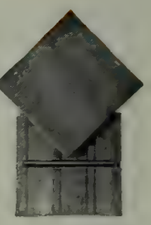


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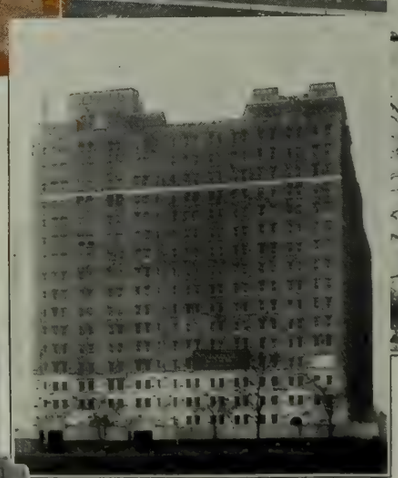


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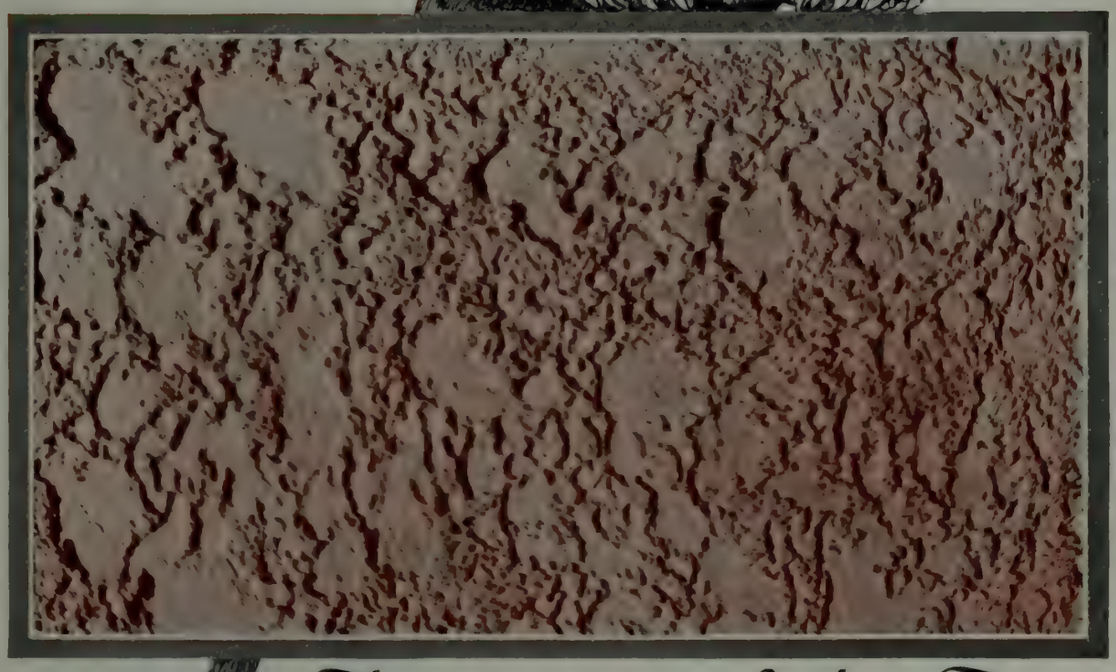
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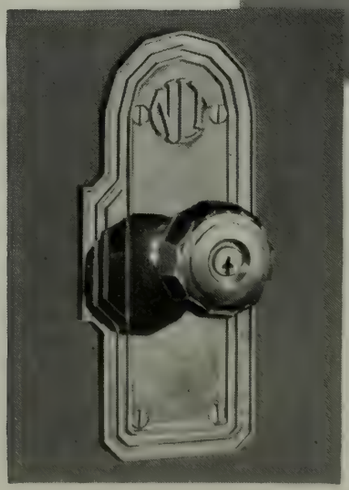
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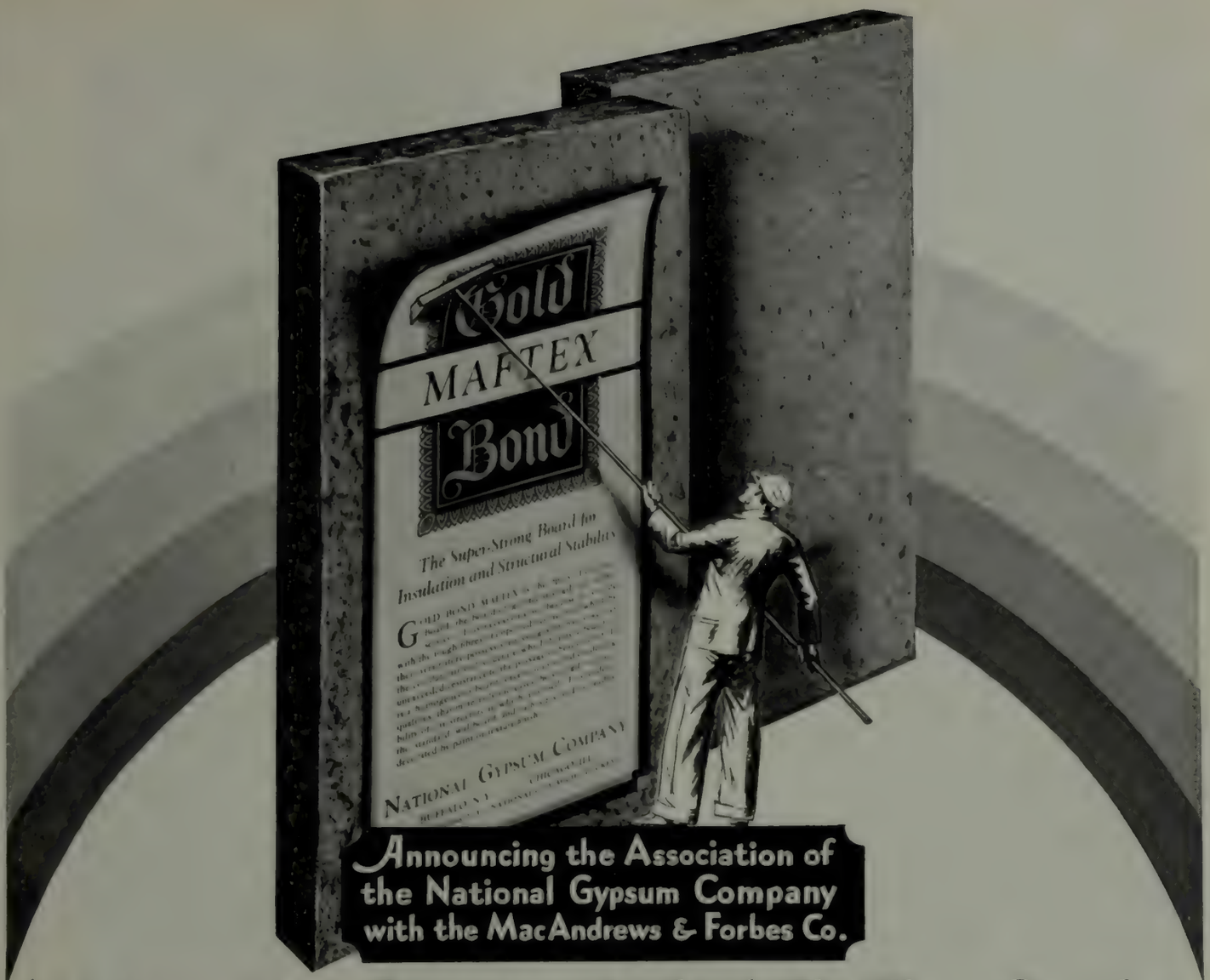
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*Makers of the *Herman Nelson Invisible Radiator*, for residences, apartments, hotels, offices and monumental structures—the *Unicent*, for the ventilation of schools, offices, churches and all buildings having an acute ventilating problem—the *Herman Nelson Inglet Heater*, for economical distribution of heat in factories, mills, garages, warehouses, and smaller buildings.

REJUVENATING OLD BUILDINGS

Old buildings suffer by comparison with the new not because their offices are any the less adequate for the transaction of business, but because they are outmoded in appearance. To keep fickle tenants and to meet competition, money must be spent—but it must be spent wisely where it will do the most good. The first move of the La Salle Building owners was to rejuvenate the lobby. Here the crowd perforce stops, here is where it receives its first impression of the building. The new Thorp elevator enclosures, just installed, play a large part in making that impression a favorable one.

THORP FIRE PROOF DOOR COMPANY

MINNEAPOLIS MINNESOTA



Thorp designed the elevator enclosures for the modernized lobby of the La Salle Building, Minneapolis. The panels are etched bronze, the doors steel tube with stippled bronze enamel finish

Specify

THORP DOORS



ROLSCREENED RESIDENCE ON THE ESTATE OF WILLIAM W. WOOD, ARDORE, PA.
Frank Seeburger and Charles F. Rabenold, Architects

. . . "IN my experience, the 'Rolscreen' has been particularly adaptable and satisfactory in its use with steel casement windows,—so much so that I consider them standard equipment in this type of building.

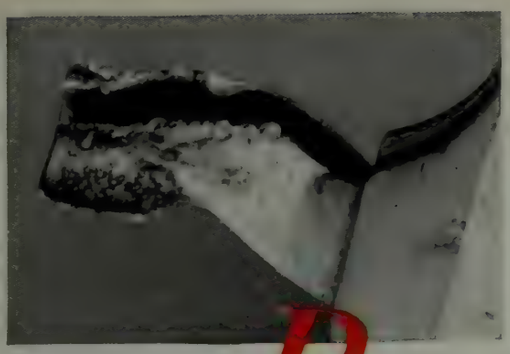
"Without any complaint from any one of a number of installations, I am free to endorse this product and the fine cooperation of the Rolscreen Company of Pella, Iowa."

Chas F Rabenold.

Mr. Seeburger and Mr. Rabenold, in accord with other leading architects of America, find Rolscreens best suited for the screening of fine windows.

Rolscreens
TRADE MARK
PELLA IOWA

Rolscreen Representatives in all Principal Cities . . . See Sweets Catalog Volume F . . . Pages F 2742-46



Burned Contacts *Banished by this* New Switch



. . . With its radically different contact springs

SUBJECT this new Hubbell Toggle Switch to the most severe test. Place it in circuit with the highly efficient type "C" lamps. Give it a year's service. Then open the switch and inspect the contacts. You will find them unharmed. Even the enormous loads imposed by gas-filled lamps fail to burn and pit this switch.

Burning of contacts at the "make" . . . the chief cause of switch failure . . . is eliminated in this new Hubbell Toggle Switch. Hubbell engineers discovered the way after months of experiment. They developed a contact spring of radically different design which overcomes the spring recoil responsible for burning of contacts.

Architects, engineers and contractors can recommend this new switch with the knowledge that it will not fail . . . no matter what type of lamp it may be called upon to control. Many improvements, other than the unique contacts, are incorporated in the new Hubbell Toggle Switch. Take a moment to go over the brief description given here.

Electrically and Mechanically Perfect in Design—"Approved"

A radically new form of contact spring scientifically designed so that two different rates of vibration are set-up in the spring; one tending to counteract the other. Thus recoil is practically eliminated in the ends of the contact spring when the solid metal contact blade strikes between them. As a result, burning and pitting of the spring is prevented.

An automatic "kick off" prevents sticking of blades in contact.

Commutator support is perfectly insulated. Commutator blades rigidly riveted to carrier, insuring positive alinement.

Spring arm is pivoted on a round shaft, seated in a symmetrical bearing, facilitating faster, smoother action without wear.

Operating mechanism is separate from the bridge and perfectly insulated.

A solid bridge with ears lies in a recess across Bakelite cover — entirely insulated; perfect alinement and rigidity insured.

Bakelite case completely encloses mechanism.

A complete line to meet any need—

9801—Single Pole, 5 amps. 250 volts; 10 amps. 125 volts

9802—Double Pole, 10 amps. 250 volts

9803—3-way, 5 amps. 250 volts; 10 amps. 125 volts

9804—4-way, 2 amps. 250 volts; 5 amps. 125 volts

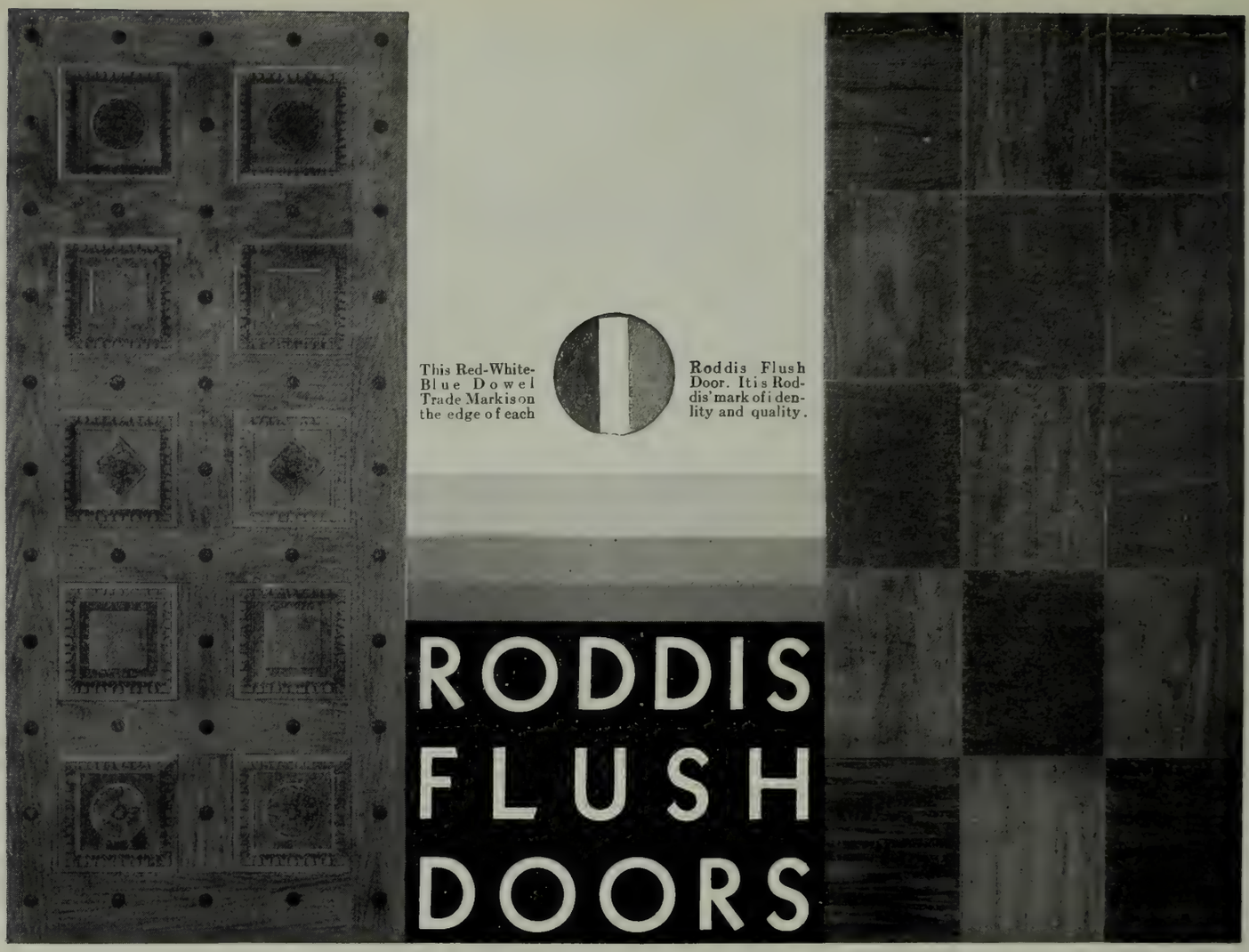
9805—Single Pole, 20 amps. 250 volts

9806—Double Pole, 20 amps. 250 volts

HARVEY HUBBELL, INCORPORATED
BRIDGEPORT, CONNECTICUT

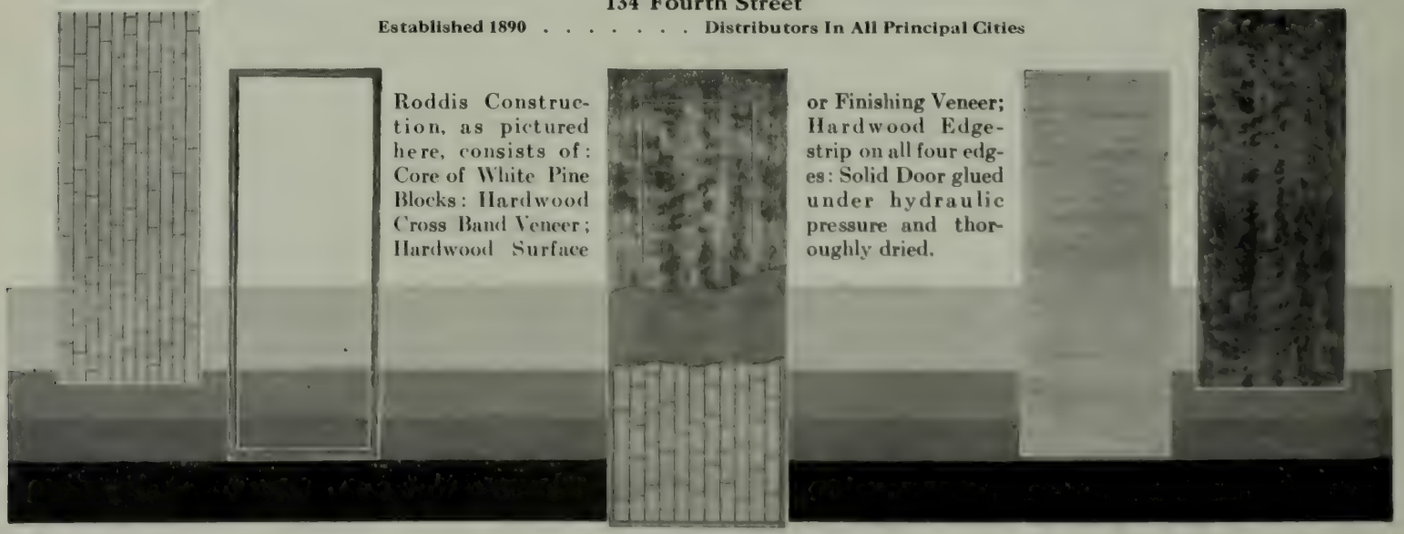
Boston, Mass., 176 Federal St.; Atlanta, Ga., H. C. Biglin, 138 Marietta St.; New York, N.Y., 122 E. 42nd St.; Chicago, Ill., 318 W. Washington St.; Denver, Colo., T. H. Bodfish, 1109 Broadway; Philadelphia, Pa., Fifth St., Phila. Bourse, Exhibition Dept. Harvey Hubbell Co. of Canada, Ltd. 7-12 Labatt Ave., Toronto

HUBBELL
Toggle Switches



FANCY work, of the character illustrated above, is also had in Roddis Flush Door construction, detailed below. The door at the left is of special sawn white oak with hand carved mouldings and ornaments. The door at the right is of one-eighth inch black walnut face veneer laid in squares and V-grooved on all joints. Two expressive examples of Roddis custom designed possibilities, with Roddis completely solid door construction.

RODDIS LUMBER & VENEER CO. . . . Marshfield, Wisconsin
134 Fourth Street
Established 1890 Distributors In All Principal Cities





New State Capitol, Lincoln, Nebraska. Architect, Bertram Grosvenor Goodhue, Associates, New York; Contractors, Peter Kiewit & Sons, Omaha. Ohio White Finish used.

Two important features of Nebraska's new capitol

THIS imposing building, beautifully designed, staunchly built, has two important features.

A plaster job that provides good acoustics—sound is absorbed, the echo defeated, transmission of noises from adjacent rooms minimized.

An interior plaster finish that will preserve through the ages the decoration applied to it.

These two advantages were secured through the use of *original* Ohio White Finish.

See Page B-1981
SWEET'S

OHIO HYDRATE & SUPPLY CO.
WOODVILLE, OHIO
Charter Member of the Finishing Lime Association of Ohio

for BETTER PLASTER Specify

OHIO WHITE FINISH

Our lime is marketed under four brand names—Ohio, Hawk Spread, Woodville, Buckeye. All are of equal quality—all are packed in Red Zig Zag Bags

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Kansas City, Mo.
Owen, Payson & Saylor
Architects
Fogel Construction Co.
Genl. Contractors
G. C. Turner
Plastering Contractor





Auditorium (above) and Ballroom (left) are plastered with lime and have remarkably good acoustics.

LIME PLASTER for Better Acoustics

THE ability of lime plaster to absorb sound is definitely demonstrated in Ararat Temple of Kansas City, Mo.

To assure good acoustics lime plaster was chosen for the auditorium and ballroom. Since the building has been in use, members report that everyone has noticed a marked difference in the acoustics of these two rooms as compared to the rest of the building. The acoustics of the two lime-plastered rooms are excellent, whereas considerable ringing is noticeable in all other rooms.

Architects are relying more and more upon lime plaster, not only for better acoustics, but also for sharpness of detail in design and for enduring attractiveness.

Lime is the only time-tested, all-purpose plastering material. Progressive architects who keep abreast of the latest developments are specifying lime for the better class buildings --theatres, churches, the finer residences and apartments.

Have you sent for your copy of our new specifications for lime plaster? Write today for A.I.A. Document No. 21A1.



Rely on LIME
-tested by time

NATIONAL LIME ASSOCIATION

An organization of leading lime manufacturers formed to encourage a better appreciation of the economic value of lime in all its uses.

142-A

713 Phillips Building « WASHINGTON, D.C.

TURNING PLANS INTO REALITY



WESTERN UNION TELEGRAPH COMPANY BUILDING, NEW YORK

TODAY—the development of American architecture has reached a plane that holds the undivided attention — the admiration and acclaim of the entire world.

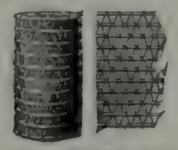
Today—the architect and builder are causing vast edifices to tower more and more toward the sky—to stand as enduring monuments to present standards of design and efficiency of materials.

Today—as in years past—the American Steel and Wire Company is supplying a major portion of the wire fabric (the steel backbone of concrete) that enables plans to be turned into reality.

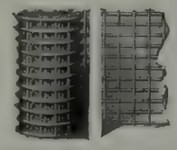
So—we take justifiable pride in the confidence engendered by our products—and extend the full services of our engineering and technical staffs to the solution of specific reinforcement problems. Write to our nearest sales office for information and literature.

WIRE FABRIC

THE STEEL BACKBONE OF CONCRETE



Triangle Mesh Wire Fabric Reinforcement. Furnished in rolls or sheets.



Electric Weld Wire Fabric Reinforcement. Furnished in rolls or sheets.

Western Union Telegraph Company Building, New York, Voorhees, Gmelin & Walker, Architects. Marc Eidlitz & Son, General Contractors. Senn-Herricks Corp., Fireproofing Contractor.

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JOHNS MANVILLE

JM

PRODUCTS



The new Johns-Manville Asbestos Shingles are designed as to texture and color to provide materials from which you may choose a roof suitable to virtually every type of house. In the accompanying illustration we show a closeup of Johns-Manville Asbestos Shingles in place on a roof. Ample thickness provides interesting shadow lines, while the texture of the shingles themselves is also attractive. We believe that by using Johns-Manville Asbestos Shingles you can obtain not only a safe, permanent roof but also the effect you desire.

Johns-Manville

RIGID

ASBESTOS SHINGLES

JOHNS MANVILLE
JM
PRODUCTS

Harmonious colors in Asbestos Shingles

An outstanding Johns-Manville achievement

TO say that Johns-Manville Asbestos Shingles are available "in a full line of colors" would be to employ a commercial phrase suggesting the usual assortment of harsh, glaring tints of red and green commonly found in manufactured roofing.

We do offer "a full line" but all colors show the restraint of well informed aesthetic taste. These colors and blends have been developed with a view to harmonious results when used in various combinations, also when seen in relation to other materials.

Thought has likewise been given to the needs both of traditional and so called "modern" design.

For example, there are the Salem grays. In these shingles we have permanently caught the interesting grays of the old weathered New England farmhouse roofs. In other types, harmonious blends adaptable to Tudor and early English tradition, both in color and texture, are obtainable. In still others, the modern flair for more colorful enrichment, without bizarre effect. The coloring of J-M Asbestos Shingles is but one of their merits. They also have the thoroughly practical advantage of being fireproof and resistant to weather exposure. Properly laid, they may be considered entirely immune to damage for the life of the building which they cover. Repair and maintenance cost may be dismissed as an entirely negligible item.

Made with a Definite Aim

One thing particularly we wish to stress. J-M Asbestos Shingles are manufactured to do a definite job, to combine features not found in natural materials. They are thoroughly intelligent examples of the age of fabricated materials.

Our Architectural Representatives are equipped to serve you with expert advice with reference to matters of proper application to obtain the particular effects desired. Whether it be Rigid Asbestos Shingles, or any of the many Johns-Manville products which enter into building, our men are available for intelligent cooperation.

PRODUCTS FOR THE BUILDING INDUSTRY

Acoustical Materials · Asbestocel Pipe Insulations · Asbestos and Asphalt Shingles · Built-up Roofs
Home Insulation · Insulating Board · Transite · Tile Flooring · Floridene Stone

Johns-Manville

New York Chicago Cleveland
San Francisco Toronto

Pink Tennessee in quiet, enduring rubber

Here is a striking example of the new freedom enjoyed by architects in their use of modern building materials. The floor of this corridor is Stedman Reinforced Rubber Tiles of Pink Tennessee, with borders of Verde Antique. Yet there is no suggestion of "imitation"—no attempt to simulate a marble floor. Pink Tennessee was selected because this color type met the decorative needs. Stedman Reinforced Rubber Tiles were used because they provide a silent, comfortable, and wear-resisting floor—a fact proven by more than eight million square feet installed in institutional buildings throughout the country. • • • Make full use of color. Stedman Tiles offer 27 practical color types—illustrated in a comprehensive color chart you may have without obligation. • • •

STEDMAN RUBBER FLOORING COMPANY, SOUTH BRAINTREE, MASS.

***REINFORCED: In the Stedman Process minute cotton filaments, uniting with the rubber under high pressure and heat, are responsible for its unusual resistance to wear and distention, its lasting resilience and smooth impervious surface—characterized by color veinings of remarkable fineness and beauty.**

Stedman Reinforced* Rubber Tile

CONTINENTAL Illinois Bank and Trust Company, Chicago. Graham, Anderson, Probst & White, Architects, Chicago.



Corridor Photograph Copyright by E. L. Fowler, Chicago.

A Corridor on the Fourth Floor. The field and lighter borders are Pink Tennessee, each large panel in square tiles laid with the grain alternating. Narrow strips are of Verde Antique, a rich black with veinings of sea green and cream.

Holds itself out—and *Holds on!*



NEVER before such a remarkable spot-stopper. Insures trouble-proof painting on plaster! "Holds itself out," and seals against suction, lime, alkali and moisture spots! Will not penetrate substances as porous as newspaper, yet holds on with a never-let-go hold, and adds elasticity to finishing material! Here's a test piece of tin, undercoated with Wallhide, and over it a poor grade (not Wallhide) finishing coat. It actually requires prolonged bending and rebending of the metal to fracture the cheap, naturally brittle outer coating, so protective is the help of the Wallhide undercoat. And the undercoat itself is unblemished.

Velumina Wallhide

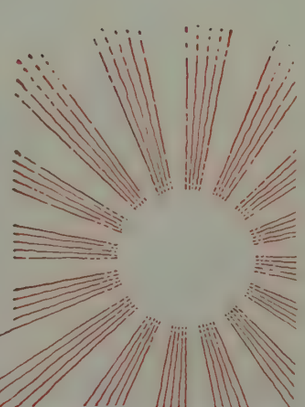
First Coater and Finishing Flat

A new type product that trouble-proofs painting on plaster as never before possible.

Velumina Wallhide First Coater usable under any flat wall paint — securely seals as no other product or material against moisture, lime, alkali and suction spots!

Velumina Wallhide Finishing Coat —seals places skipped by first coater or where knobs of plaster have been knocked off. Tintable with oil colors to soft mellow tones. Easy to wash! Great coverage and hiding!

Write for booklet "Velumina Wallhide — the Great Spot-stopper!"



PITTSBURGH PLATE GLASS CO.

Paint, Varnish and Lacquer Factories, Milwaukee, Wis. Newark, N. J., Portland, Ore., Los Angeles, Cal.

PITTSBURGH Proof Products
Glass
Paint - Varnish
Lacquer - Brushes

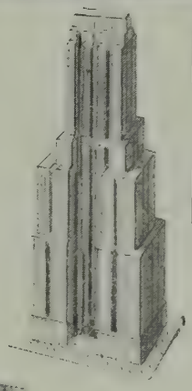


Natco Vitritile in Jefferson Medical College, Philadelphia, Pa. Horace Trumbauer, Architect; Doyle & Co., Contractors.

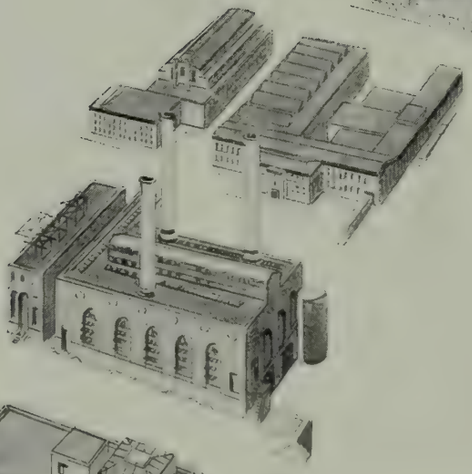


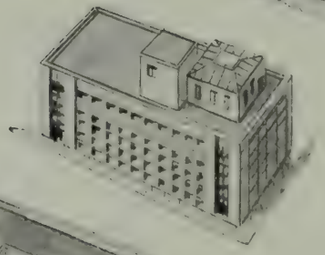






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WITH a multiplicity of standard sizes and shapes that suit practically every condition and dimension and a range of beautiful shades to meet wide color-design requirements, Natco Vitritile (glazed and enameled) is a building material of infinite possibilities.

The load bearing units, finished both sides, can be used in exterior walls and partitions, on which no painting, plastering, or other finish is ever required. The units finished one side can be used for a variety of interior work. Kerfed units are available for furring.

Bullnose closures, sill, and lintel tile; wainscot, cove base, chamfered corner tile; these and numerous other types permit the obtaining of striking and unique effects.

Natco Vitritile brings to designer, builder, and user, immediate and permanent satisfaction.

TURN TO SWEET'S



NATCO
THE *COMPLETE* LINE *of*
STRUCTURAL CLAY TILE

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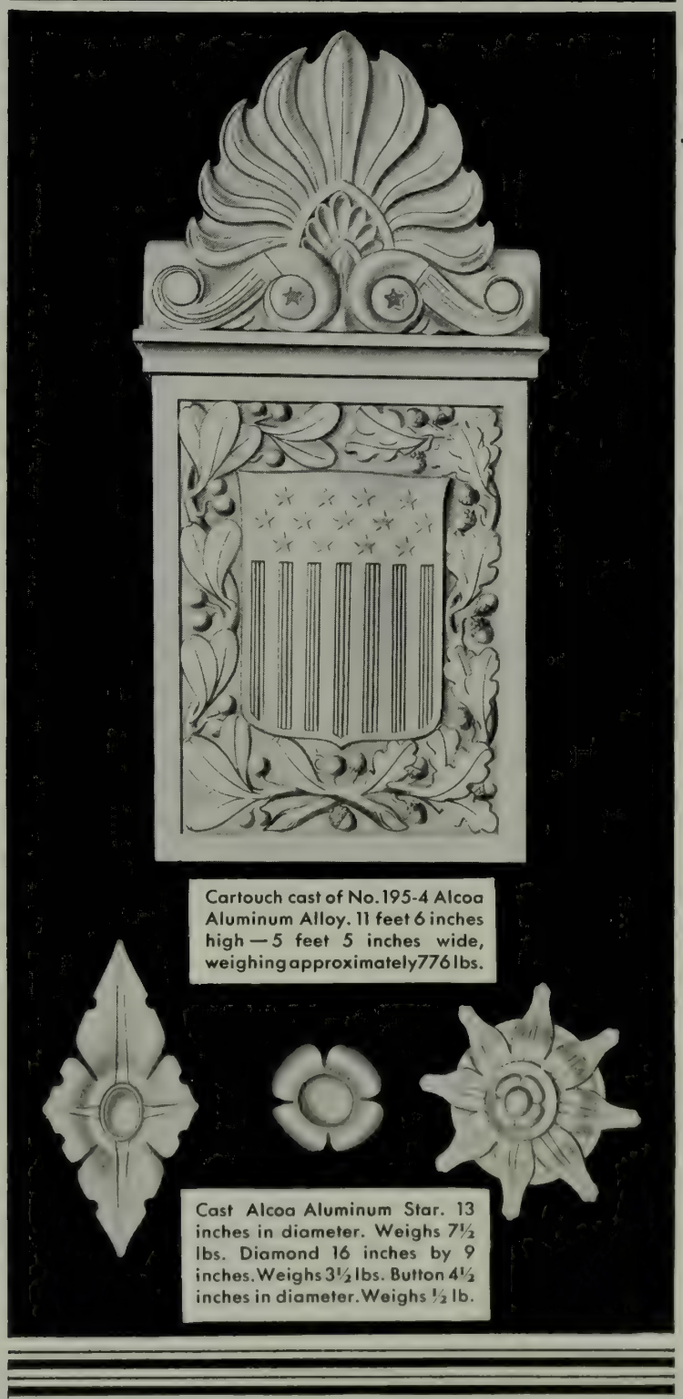
THE LARGEST CONCERN IN THE WORLD MAKING A COMPLETE LINE OF STRUCTURAL CLAY PRODUCTS

GENERAL OFFICES: FULTON BUILDING, PITTSBURGH, PA. BRANCHES: NEW YORK, CHANIN BUILDING; CHICAGO, BUILDERS BUILDING; PHILADELPHIA, LAND TITLE BUILDING; BOSTON, TEXTILE BUILDING AND NATIONAL FIRE PROOFING COMPANY OF CANADA, LTD., TORONTO, ONTARIO



Bascule draw span for Arlington Memorial Bridge at Washington, D. C. McKim, Mead and White, architects. Phoenix Bridge Company, Phoenixville, Pennsylvania, contractors for bascule span. Decorative castings, balustrade, balustrade cap, base and rail, etc., of Alcoa Aluminum. See next two pages for particulars.

Draw Span of Arlington Memorial Bridge



Cartouch cast of No. 195-4 Alcoa Aluminum Alloy. 11 feet 6 inches high — 5 feet 5 inches wide, weighing approximately 776 lbs.

Cast Alcoa Aluminum Star. 13 inches in diameter. Weighs 7½ lbs. Diamond 16 inches by 9 inches. Weighs 3½ lbs. Button 4½ inches in diameter. Weighs ½ lb.

Lightness with Strength

The Arlington Memorial Bridge, of which McKim, Mead and White are the architects, is one of the outstanding works of monumental architecture.

About 50,000 pounds of cast Alcoa Aluminum are being used on the bascule draw span for the cartouch and keyblock, for decorative castings, for balustrade, balustrade cap, base and rail, and for bed molding and torus molding. By using Alcoa Aluminum for these parts of the draw span, a dead-weight saving of approximately 100,000 pounds will be secured. Any other metal that might have been used would weigh roughly 3 times as much as the Alcoa Aluminum.

For decorative purposes, the cartouch here illustrated, was used on each side where the bascule leaves meet. The small ornaments, of which there are hundreds, were used in the load-carrying substructure of the lift section.

By using the light, strong Alloys of Alcoa Aluminum for both structural and decorative architectural purposes you are assured of maximum strength, coupled with extreme light weight. Alcoa Aluminum is much easier to truck and erect. In addition, Alcoa Aluminum does not require painting as a protection against rust. Alcoa Aluminum cannot rust and it therefore will not

relieved of 100,000 lbs. dead-weight

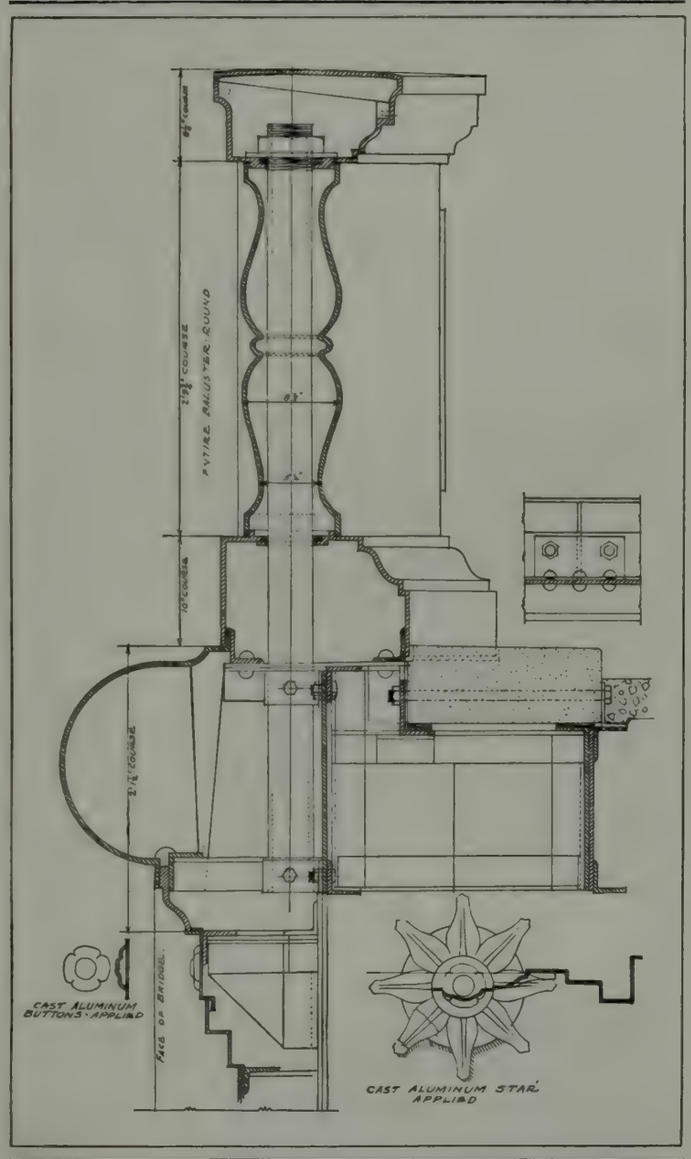
streak adjoining surfaces. This modern metal possesses great ductility—a characteristic that eliminates many of the difficulties encountered in erecting other metals. Alcoa Aluminum can be easily fitted into the irregularities in stone work.

On commercial and institutional buildings Alcoa Aluminum is being extensively used for spandrels, cornices, doors, grille work, newels, ornamental fences, panels, skylight and window frames, ventilators and sheet roofing.

Specifications

These aluminum cast items were made to Navy Specifications No. 46-A-1a, which correspond to Alcoa Aluminum high tensile strength Alloys No. 195-4. This Alloy is specified where tensile strengths are required higher than those offered by No. 43 Alcoa Aluminum Alloy, which is customarily used on architectural work.

Our nearest office will be glad to talk with you about the architectural use of Alcoa Aluminum and its light, strong Alloys that have been developed for use in this field. Address ALUMINUM COMPANY *of* AMERICA; 2467 Oliver Building, PITTSBURGH, PENNSYLVANIA.



ALCOA ALUMINUM



Suitable for Country Clubs and Schools— permanent, sanitary, economical Alberene Stone



The use of 4-inch curbs is recommended as a safety measure.



A large shower compartment installation of Alberene Stone.

The major requirement for both shower compartments and toilet partitions is absolute sanitation and cleanliness. Alberene Stone, because of its close-grain density, is practically non-absorbent, which assures not only ease of cleaning and sanitation but long life. Being highly resistant to acids and alkalis, this Virginia soapstone can be said to be non-staining. Its use provides floors that are non-slipping—wet or dry. The natural light blue-grey color is pleasing and harmonious.

These qualities plus the structural soundness of Alberene compartments make for permanence and economy because there is no expense for upkeep or repairs.

Complete data and specifications are contained in our catalog which will be sent, gladly, on request.

ALBERENE STONE COMPANY, 153 West 23rd Street, New York
Branches: Boston Chicago Newark, N.J. Washington, D.C. Cleveland Pittsburgh Richmond Philadelphia Rochester
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ALBERENE STONE

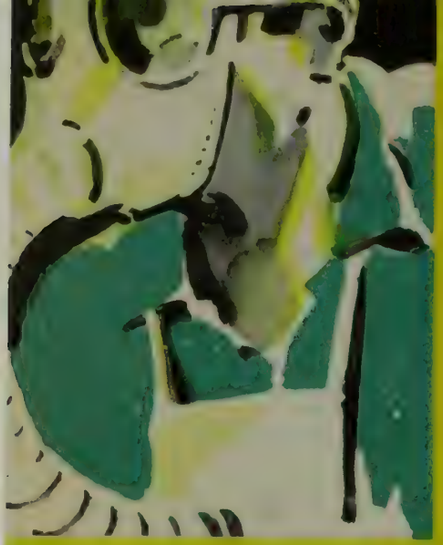
TOILET PARTITIONS and SHOWER COMPARTMENTS



Need a gas mask ?

Never!

BECAUSE →



Inspecting or cleaning a sewage pump need no longer be a "gas mask job"

INSTALL A *Jennings*

which is located above the pit where it is easy to get at

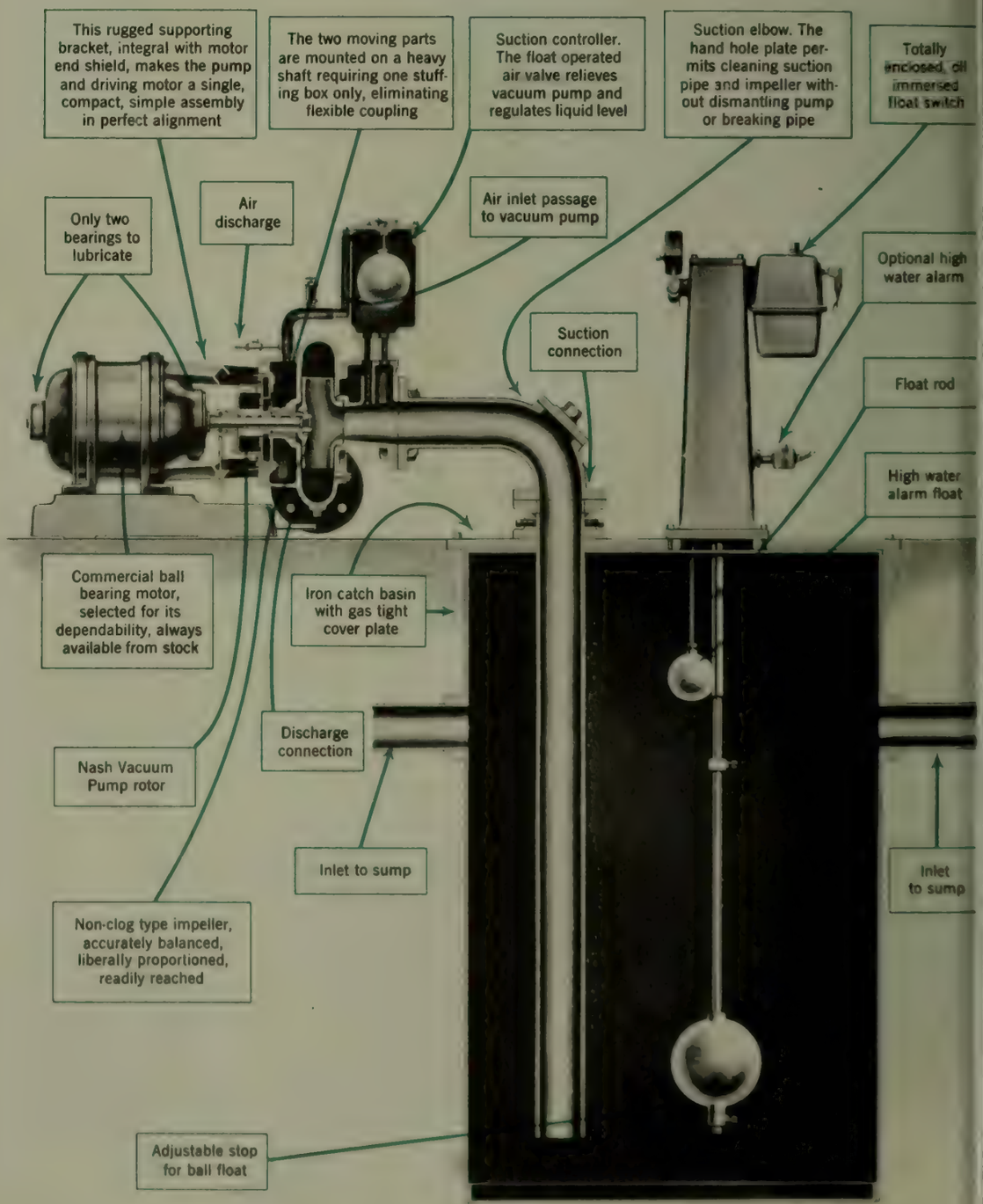
HERE is a sewage pump that is easy to take care of. Installed entirely out of the pit, the pump, driving motor and controls always are accessible.

Nothing is submerged except the suction pipe. The interior of the pump can be laid open, and the impeller removed for inspection and cleaning, without even going near the pit.

Jennings Suction Sewage Pumps are furnished in eleven sizes with capacities from 45 to 450 g.p.m. of unscreened sewage. Heads up to 75 ft. Write for Bulletins 113 and 124.

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Jennings
SUCTION
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Pumps





LONG SERVICE AND GOOD REPUTE ENDORSE BANNER LIME

Experience is the best teacher—and *the most expensive.* Without extra cost, users of Banner Finish benefit by twenty-three years' experience. Banner's good reputation is recognition of its long, effective service to the building industry. There is economy in choosing the known quality of Banner lime.

NATIONAL MORTAR & SUPPLY COMPANY · PITTSBURGH

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FAMOUS OHIO FINISH

GEORGIA MARBLE





THE WARREN G. HARDING MEMORIAL

Henry Hornbostel and Eric Fisher Wood, Archts., E. P. Mellon, Professional Adviser

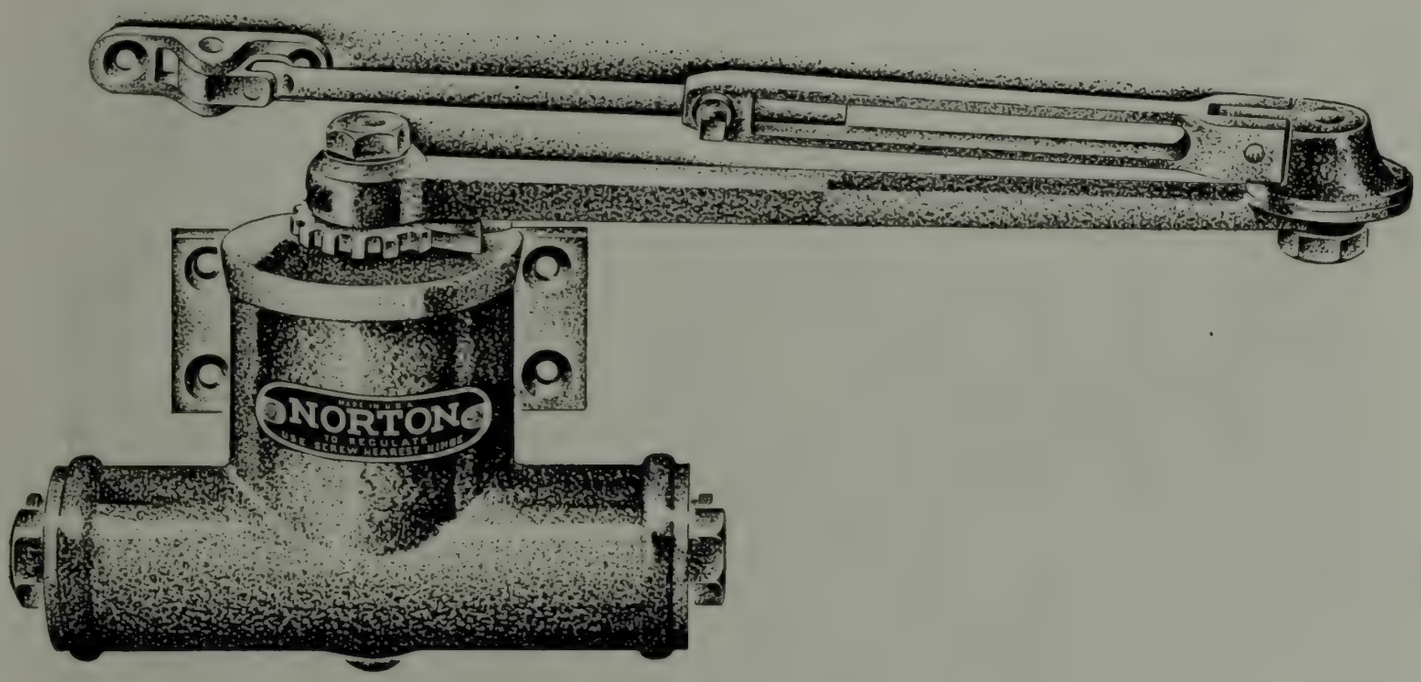
PERMANENCE

This memorial was erected to stand for generations. After the most careful consideration of several building stones, Georgia Marble was chosen as the best material. All Georgia Marble is of compact structure,—tough and practically non-absorbent . . . This means that Georgia Marble is a wise choice for any structure where beauty and freedom from upkeep expense are factors.

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NEW YORK	ATLANTA	CHICAGO	DALLAS	CLEVELAND

NORTON
DOOR CLOSERS
CONTROLLED ACTION



Norton-closed doors are *controlled* doors. They close smoothly and silently.

See Sweet's pages B2408-2412

NORTON DOOR CLOSER COMPANY

Division of The Yale & Towne Manufacturing Company

2900 North Western Avenue, Chicago, Ill.

CHANCEL and PEWS

First Methodist Episcopal Church

KALAMAZOO, MICHIGAN
Ernest S. Batterson, Architect

A typical example of American Seating Company wood carving excellence and interpretation of Architect's design.

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Concrete Joist Floor Construction



Sets the Pace Anew

ARCHITECTS and Engineers have exhibited a genuine interest in the new Two-O-One North Wells Building, Chicago. For this building, towering twenty-nine stories high, is primarily a reinforced concrete structure —tallest building of its kind ever attempted.

Significant is the fact that concrete joist floor construction was specified for this important development in reinforced concrete design, and that Meyer Steelforms were the choice of the contractor responsible for speeding this structure through to successful completion.

An interesting feature of the building program was the framing of two floors at one time and the placing of concrete on two floors consecutively—a plan that saved at least a day per floor.

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SCOTLAND selects this cream-white cedar for a famous hotel



Internationally famous Gleneagles Hotel, Perthshire, Scotland. Reception rooms, corridors and bedrooms finished with Port Orford Cedar.

The use of Port Orford Cedar as interior trim in many of the world's stately buildings is a tribute to the merits of this fine white cedar.

Among such buildings are the United States National Bank building, Portland, Oregon; the Biltmore Hotel of Los Angeles, for interior trim of all dining rooms and rooms above the second floor; interior trim of the Gleneagles Hotel, Perthshire, Scotland.



One of the Gleneagles reception rooms finished with Port Orford Cedar

The satin-smooth surface of Port Orford Cedar takes enamel readily—holds it for years. No grain shows through. Doesn't crinkle or blister. Needs no unusual priming coat.

Its cream-white color stains readily to true, even, warm tones. Soft and pliable, this wood works easily—never checks, splinters, warps or twists. Holds nails with unusual tenacity. Is free from pitch, knots and rosin.

Light and strong, weather and decay resisting, Port Orford Cedar is preferred for entrances, porch columns, garden furniture; bulkheading, tunneling, decking, boat building. Acid-proof, it is used in over 90% of the world's storage batteries. It does not warp and is extensively used for Venetian Blinds.

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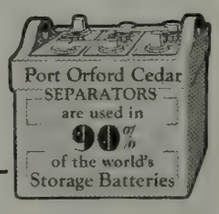
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STEEL SHEETS



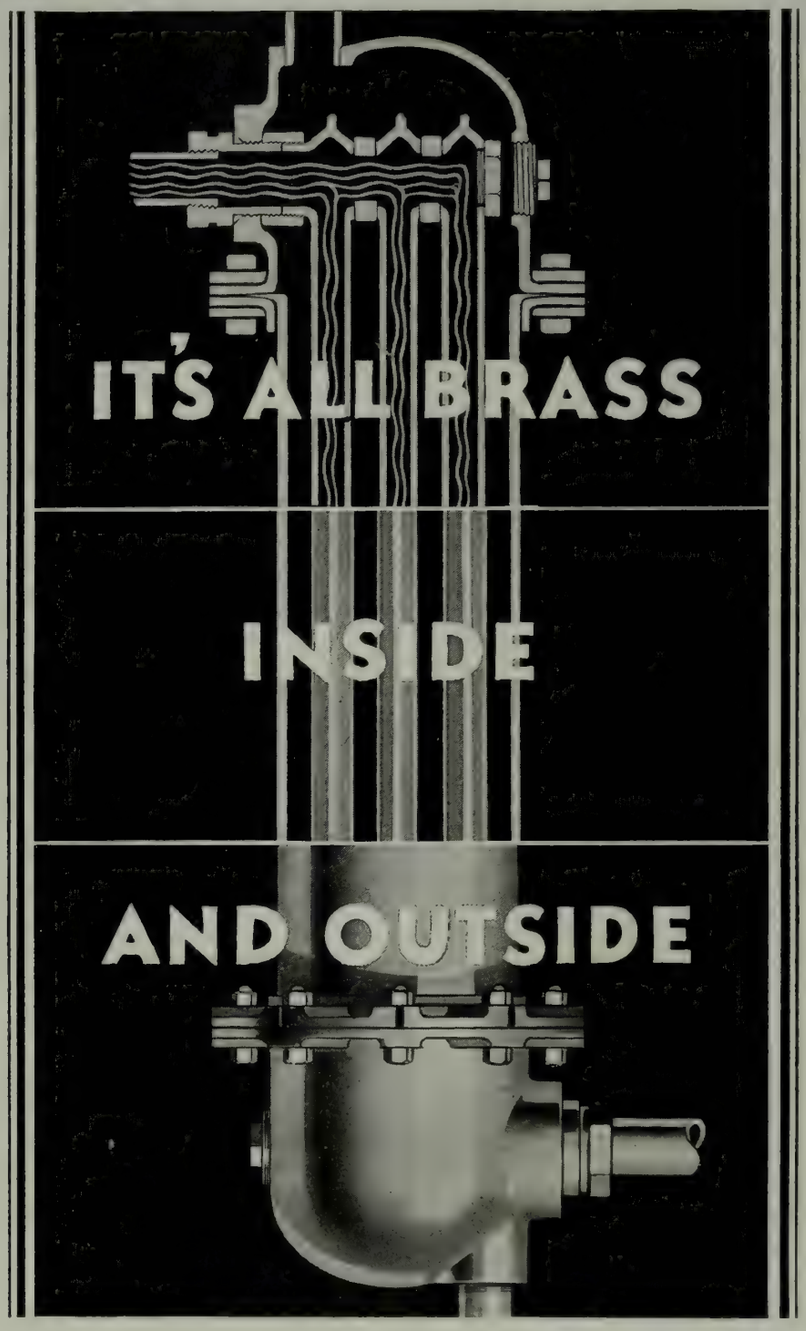
IN THE past, beauty of household appointments was reserved for those few who were wealthy and powerful enough to take artists into their households or give them special commissions. Today, however, such beauty is for everyone. Crane Co., with its unswerving devotion to an ideal has employed the finest workers in metals, in porcelain, china, and stone to design its appointments. Then with its unsurpassed resources and its 75 years of manufacturing experience, it has been able to recreate these productions on a basis so soundly economic that they can be installed at no greater cost than ordinary plumbing. For a full appreciation of this achievement, for a realization of how it will enhance the structures you build, visit the Crane National Exhibit Rooms.

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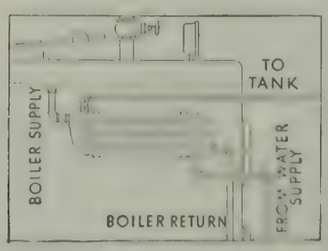
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In other words, IT ENDS FREQUENT SHUTDOWNS!

No need to take "time out" to remove sediment from this heater. It's all brass. Consequently there isn't any sediment — only one of the *many* interesting things about the Aulbras Hot Water Heater. For instance . . .

Waterways are streamlined — offering greatest surface contact and least resistance to passage of heating element. Result: rapid flow of heating element, rapid transference of heat.



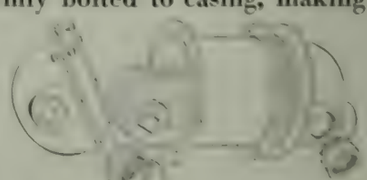
It works at any angle, "goes" anywhere. It can be installed either horizontally or vertically — without friction-producing return.

Aulbras heaters are smaller, lighter and better looking than those with the cast iron shell. Reason—more water surface in less space!

The extremely neat brass exterior shell makes a fine appearance — especially in the "up-to-minute" modern residential cellar. Or in *any* ship-shape boiler room, for that matter. Note the compact, sturdy construction of this heater. All parts are made of brass. Waterways are made of brass electrically welded together. Heater heads (reversible) are firmly bolted to casing, making a steam-tight joint.

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Clinton, Mass., Savings Bank, Hutchins & French, Archts., J. E. Chatman, Engr., Lynch & Woodward, Heating Contrs.

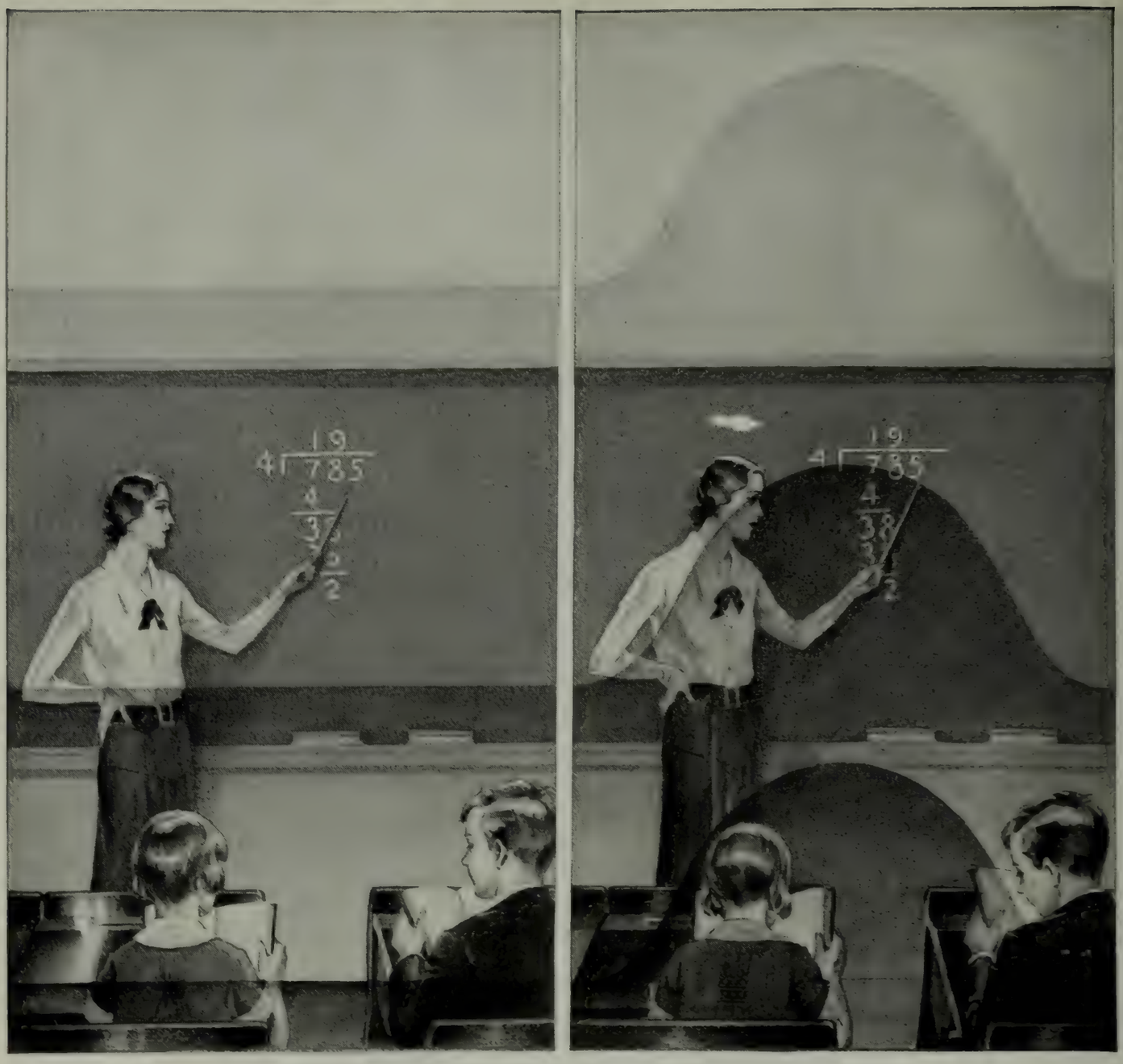
The old question of where to put that radiator almost answers itself—when the radiators are Robras 20-20. They fit in the most convenient place of all—in the wall, out of the way and out of sight.

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TRADE **YALE** MARK

SIX OUT OF EIGHT ARE YALE EQUIPPED

■

■

THIS original sketch, drawn by Yasuo Matsui, architect, and recently featured in metropolitan newspapers, indicates the comparative height of New York's tallest skyscrapers.

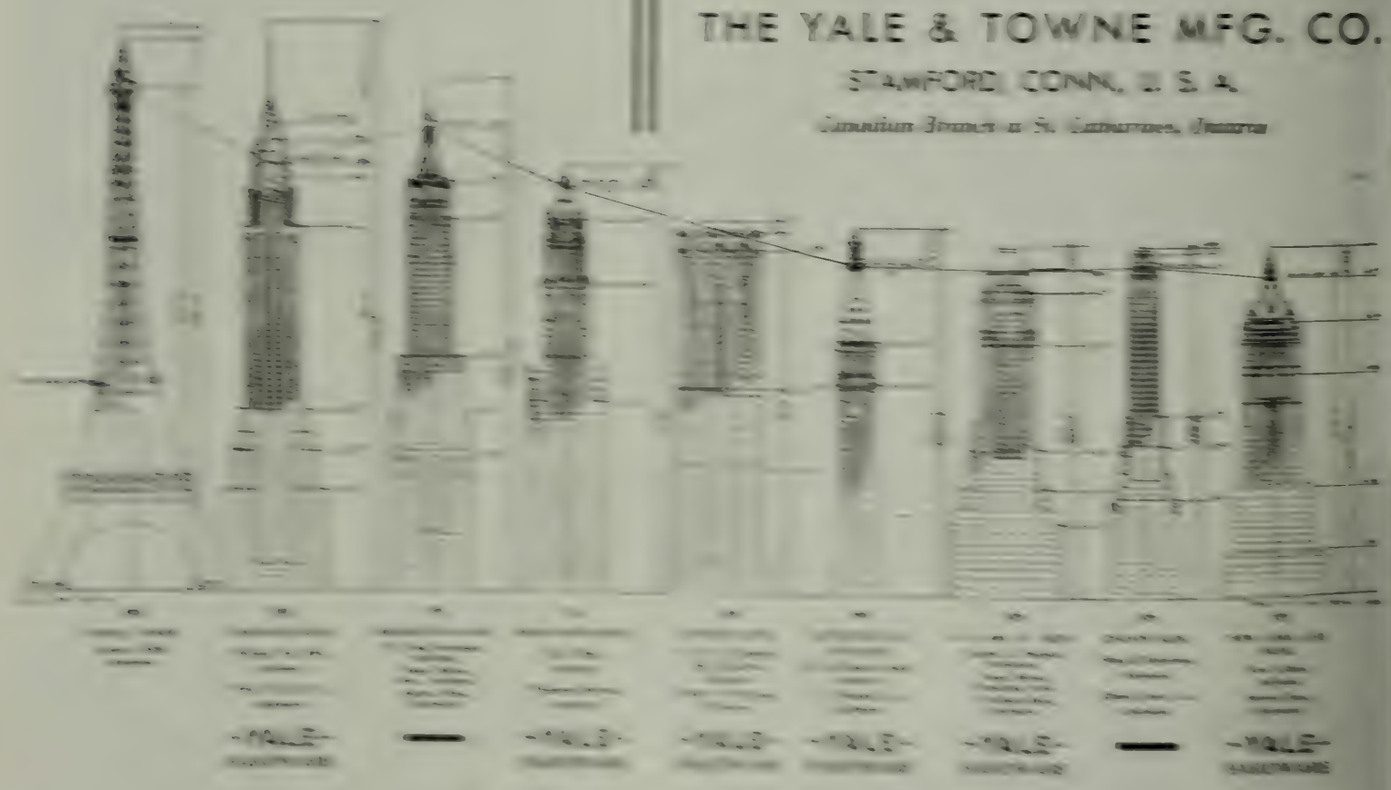
It is interesting to note that of the eight buildings shown, six are equipped throughout with Yale locks, Hardware and Door Closers. Yale Standardized Locks eliminate installation details and make possible the interchanging of locks in the same mortise, whenever operation variations may be desired, simplifying the problem of the architect, owner and contractor.

Architects who build for the future specify YALE.

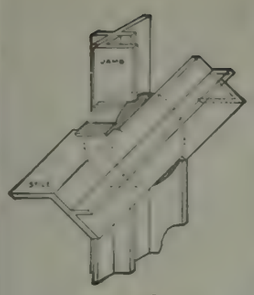
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Flash the Story of Careful Wiring

To guard against hazards of heating appliances left "ON"





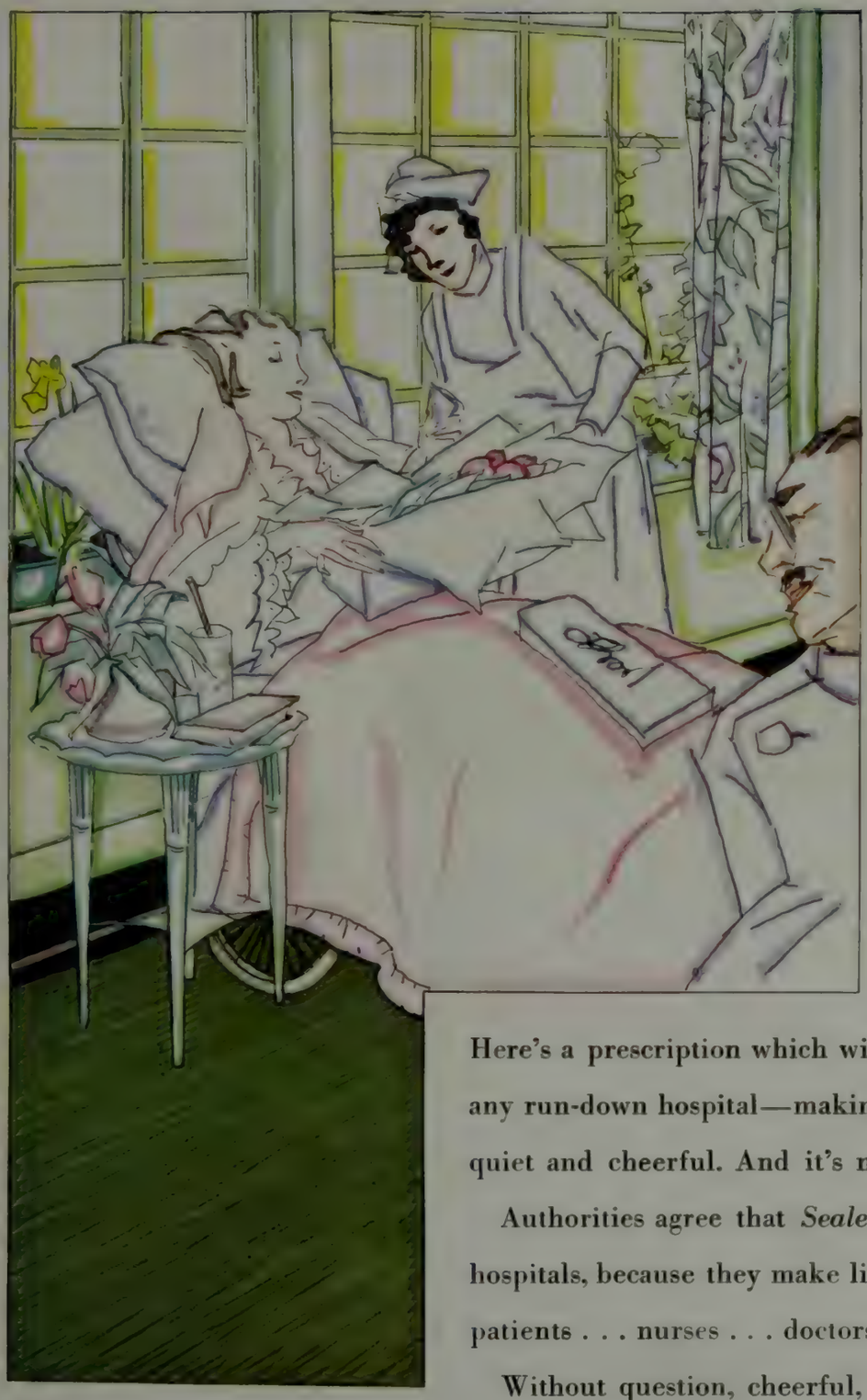


Here, the Architect may point to a SAFETY feature in the wiring of residential jobs. Warning Light shows RED when current is "ON" in Receptacle. Which shows the client you've taken precaution to safeguard the home against over-heating of heating appliances . . . In kitchens, laundries, dining rooms, bedrooms, H & H "No. 7711" warns against negligence with electric flatirons, cookers, toasters, heating pads, curling irons &c. . . . With safety you have STYLE in this new device. Brass plate, or molded brown "HEGEMITE" with ribbed surface and art border. Bullseye FLUSH with plate; no projection. Neatly designed to attract attention to a wiring safeguard which deserves it! Catalogue "U" gives specifications on this and OTHER wiring-advances of interest to the architect. May we send you this book for the newer planning of lighting systems?

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THE ARROW-HART & HEGEMAN ELECTRIC CO.

HARTFORD, CONN. MAKERS OF ELECTRIC SWITCHES SINCE 1890



THIS cheerful sun-room is certainly a far cry from most hospital interiors! But look closely, and you will see that the cheerful effect is created without the slightest sacrifice of modern sanitary requirements. Color—in the washable tinted walls, in the furniture, in the restful floor of *Sealex* Jaspé Linoleum—makes any hospital room more livable and comfortable.





"Good Medicine" for the hospital

Here's a prescription which will go a long way toward "curing" any run-down hospital—making it comfortable, and keeping it quiet and cheerful. And it's not an expensive remedy, either!

Authorities agree that *Sealex* floors are "good medicine" for hospitals, because they make life easier and pleasanter for all—patients . . . nurses . . . doctors.

Without question, cheerful, colorful surroundings do much to shorten the convalescence period. Let us suggest to you that one practical and successful way to apply color to hospital interiors is to install *Sealex* floors.

Sealex materials justify the use of pleasant tones and restful tints *underfoot*, because they are so completely

PRESCRIPTION
for the
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℞

COLOR
QUIET
COMFORT

Apply ingredients to exposed surfaces causing the irritation. Valuable as both a sedative and a restorative.

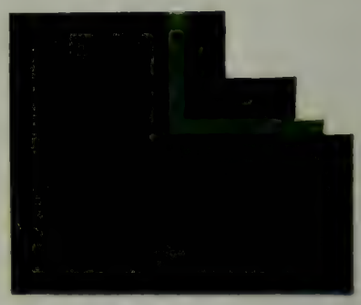
[*Continued on following page*]





Space permits us to show only a few of the many colors in which you may obtain these quiet, comfortable floors. Write us if you are interested in knowing more about *Sealex* Linoleums and *Sealex* Tiles.





"Good Medicine" for the hospital

[*Continued from preceding page*]

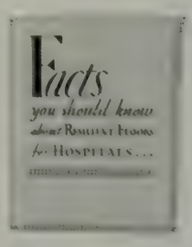
sanitary and easy to clean. Wear will not make *Sealex* floors grimy and spilled things will not spot or stain them.

With *Sealex* materials at hand, we can forget our former inclination to hold to dull, hard and noisy floors for the sake of sanitation, and can apply to floors the modern principle of color-therapy.

Now for *comfort! Sealex* floors make a great change in the peacefulness and restfulness of any hospital. They deaden sound and cushion footsteps. *Sealex* floors muffle the noises which are so trying to patients—but which are unavoidable when hard-surfaced floors are present. And because they are easy underfoot, they conserve the nerves and vitality of the hospital staff.

Sealex floors may be as simple and inexpensive, or as richly decorative, as you desire. *Sealex* materials come in a profusion of colors and patterns. And when our "ready-made" patterns are not exactly what is desired, we will submit designed-to-order floor patterns. Write us for more information about Bonded Floors of *Sealex* materials.

CONGOLEUM-NAIRN INC., GENERAL OFFICE: KEARNY, N. J.



You'll be interested in this authoritative booklet on hospital floors, prepared by architects. May we send you a copy?

BONDED FLOORS

BONDED FLOORS are floors of *Sealex* Linoleum and *Sealex* Treadlite Tile, backed by a Guaranty Bond. Authorized Contractors for Bonded Floors are located in principal cities.



(*See preceding page*)

ARCHITECTURE
by Starrett & Van Vleck

RENDERING *by* Hugh Ferriss

FOUNTAINS *by* Halsey Taylor

Abraham & Strauss Building
Brooklyn





THE New Abraham and Strauss Department Store Building in Brooklyn as it will look when completed is shown above in a rendering by Hugh Ferriss. The architects, Starrett & Van Vleck, ever mindful of the comforts and conveniences such a structure should insure the public, selected only the finest equipment throughout. In this superbly modern, block-long edifice Halsey Taylor Drinking Fountains safeguard the health of shoppers and employees alike, No. 626 recess type, as illustrated, in color, being used.

For schools, hospitals and industrial buildings too, architects everywhere recognize that Halsey Taylor Drinking Fountains meet the time-tested traditions of their profession and that they can specify them with fullest confidence. »The Halsey W. Taylor Company, Warren, Ohio.



No. 626
An attractive recessed Vitreous China Wall Type Fountain used in the building shown.

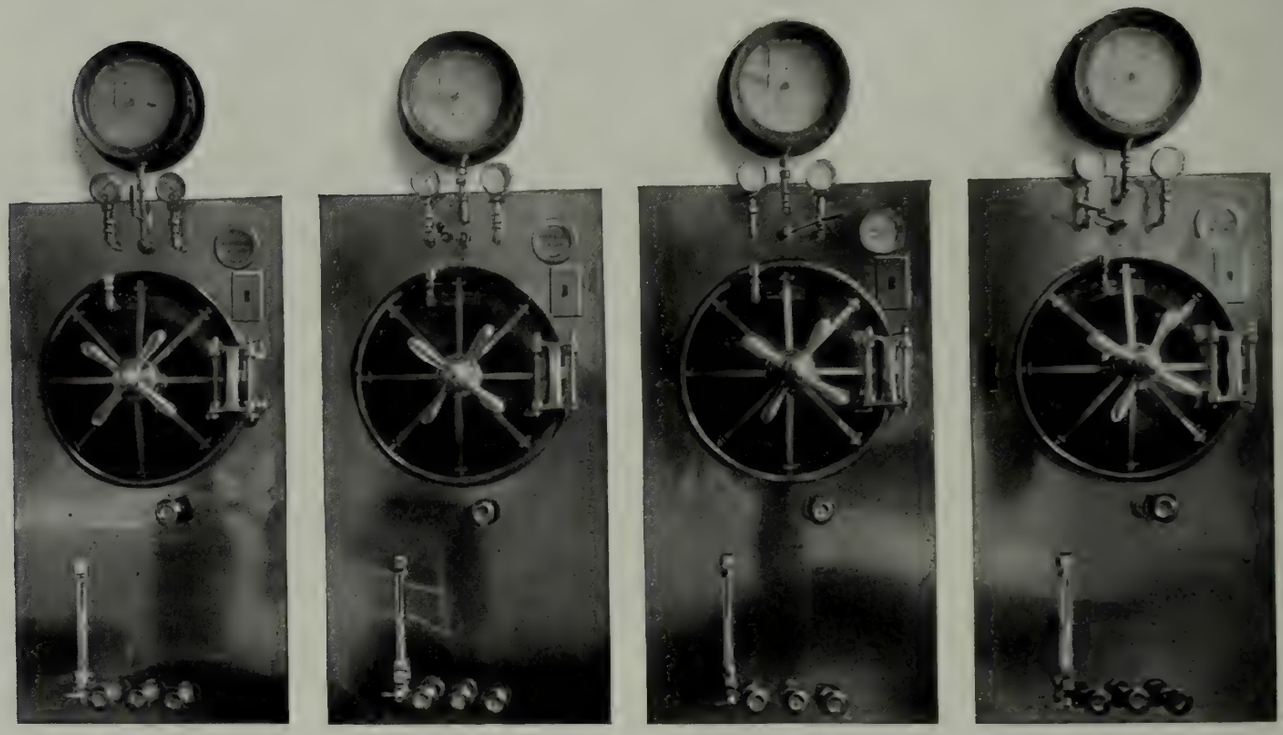
See Sweet's Architectural Catalog ~ 14 pages

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HALSEY TAYLOR
Drinking Fountains

THE SPECIFICATION FOR SANITATION

Leading Hospitals favor *Sanitary* *Monel Metal* for clinical service



"Climax" built-in sterilizers with Monel Metal panels, installed in the Beth Israel Hospital, New York, N.Y., by THE HOSPITAL SUPPLY COMPANY and WATTERS LABORATORIES, CONSOLIDATED. Architect: LOUIS ALLEN ABRAMSON, N. Y.

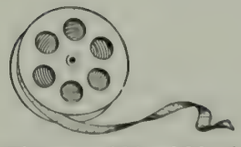
IN planning the modern hospital no factor deserves more careful attention than the selection of clinical equipment—particularly in regard to construction and quality. Here, above all, the question of first cost is subordinate to the principle of lasting efficiency and long-run economy.

For this reason, many of the most important hospitals have standardized on Monel Metal equipment for clinical use. They know that the many advantages which this silvery Nickel alloy has manifested in food and laundry service can be applied with equal success to the professional side of hospital work.

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You can insure your clients' lasting satisfaction by specifying Monel Metal wherever service conditions demand low cost sanitation with enduring strength and beauty.

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THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.



Interior Tennis Court of E. B. Schley, Far Hills, N. J.

"Metal Fittings by FISKE"

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"Metal Fittings by FISKE" has become a familiar phrase among architects whose specifications always call for the *finest* in materials and workmanship. For they realize that by specifying FISKE they command the resources of an organization with over 70 years experience in this highly specialized work.



Exterior View of Tennis Court. Hyde & Shepherd, Archts.

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SPECIALISTS IN ORNAMENTAL METAL WORK







High School Building, Little Rock, Arkansas. Mann & Stern, *Architects;* John P. Almand and Wittenberg & Delony, *Associate Architects.*

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Cast stone is a building stone molded from concrete in which the aggregate is especially prepared and selected for durability and appearance. The surface is cut or otherwise treated to produce any desired finish.

THE CAST STONE INSTITUTE

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Von Duprin

Self-Releasing Fire and Panic Exit Latches

The Advantage of the Separate Specification

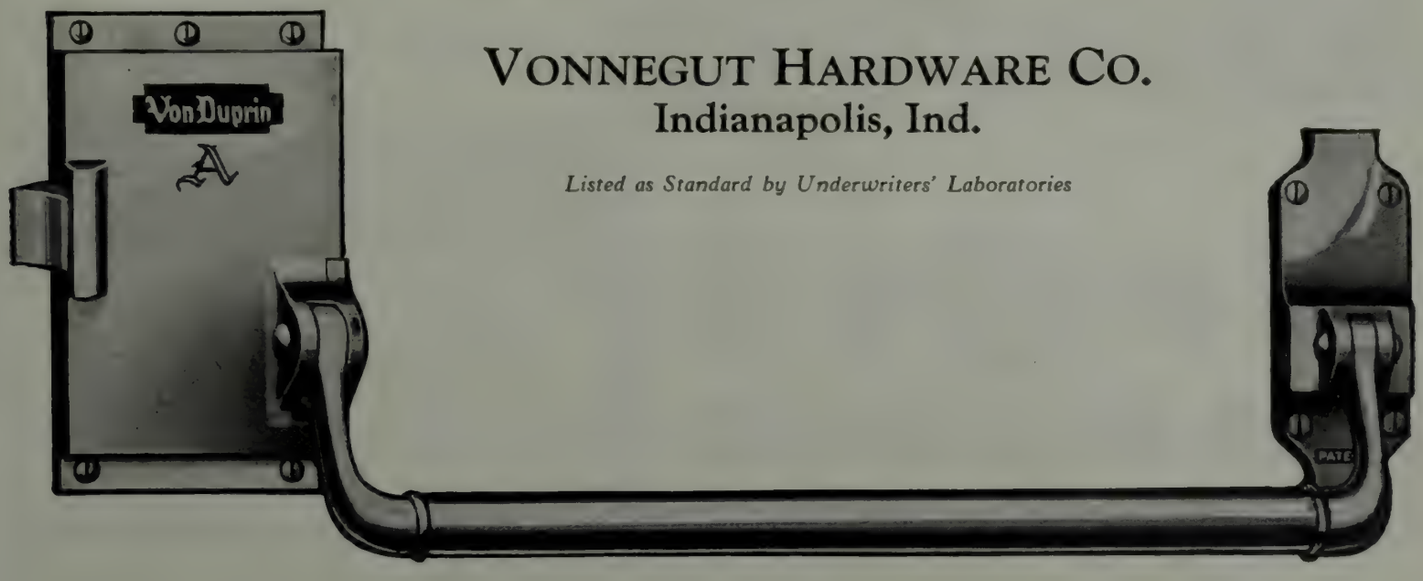
There are two ways in which panic bolts are commonly specified. Some architects include them with the finishing hardware; others make them a separate item of the specifications.

The latter method has the very definite advantage of helping the building owner get what is specified. The former always tempts the occasional unscrupulous dealer to substitute cheaper devices as part of the finishing hardware contract.

Sweets
Pages C3130-C3135

It is to prevent this that we protect all hardware dealers by selling every reputable dealer at the same fair prices.

As a further means of insuring the delivery of the genuine, we urge that you specify panic devices separately from the finishing hardware—and, of course, by name.

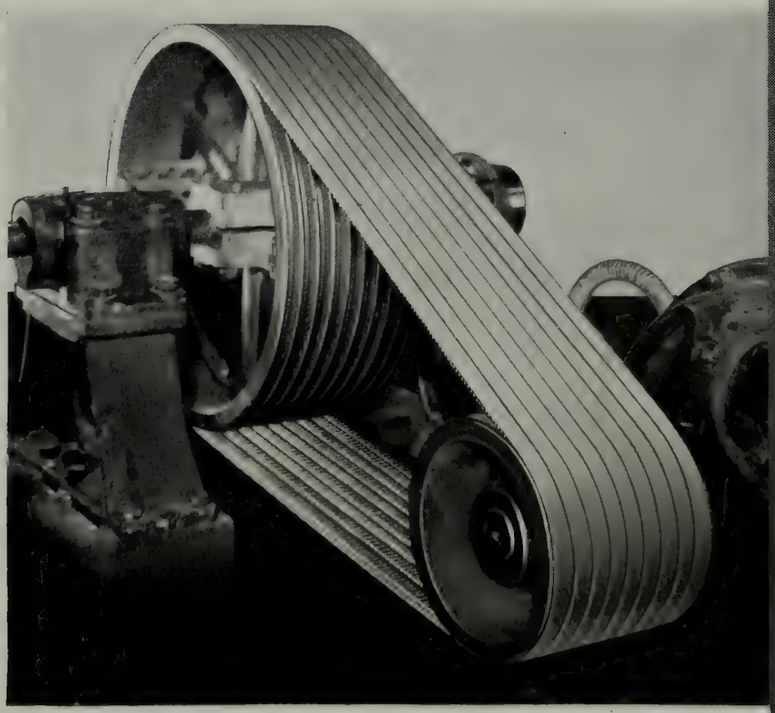


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Indianapolis, Ind.

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Install
DAYTON COG-BELT DRIVES

...they are quiet
...clean
...last longer



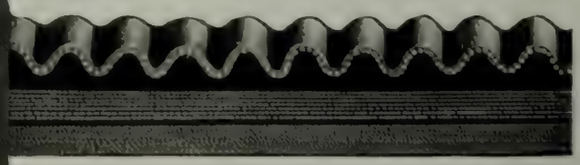
Dayton Cog-Belt Drives meet in a new and effective way the demand for quieter, cleaner and sturdier power transmission—for drives with longer life. Their construction is revolutionary. The fabric of the belts is pre-stretched, reinforced—strengthened. Less adjustment is necessary. They are die-cut . . . not moulded. They grip the pulley grooves more firmly. And they work with less tension. Therefore, there's less wear on bearings. Moreover, Daytons resist the deteriorating effects of heat, oil and water. This means far longer life and at the same time lower costs for maintenance.

Not only do Dayton Cog-Belt Drives last longer, but they run without vibration . . . quietly. Furthermore, no lubrication is necessary—no oil or grease to collect dust and dirt. And, because the belts are more firmly seated in the pulley grooves, they are more efficient. You can maintain smooth-running and uniform operation at all times.

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Gentlemen: Send me a sample of the Dayton Cog-Belt and a Dayton Cog-Belt Catalog.

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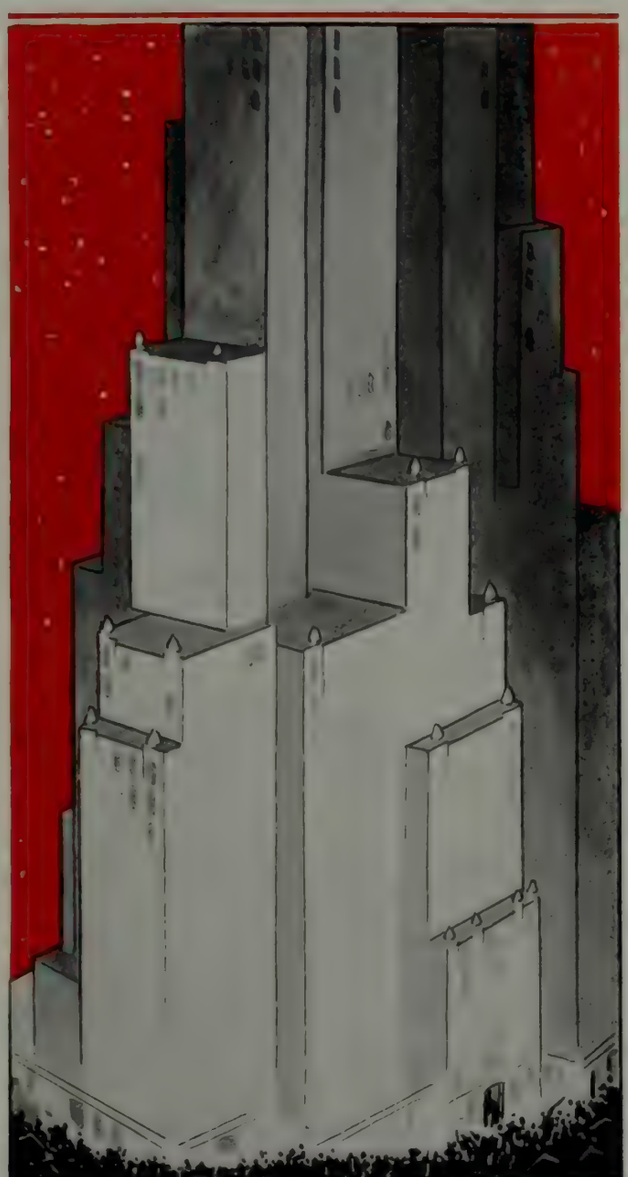
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UNSEEN *after the* BUILDING *is* FINISHED



but can they be FORGOTTEN?

PIPES are the arteries of every building—upon them rests a vitally important responsibility. Locked up between walls of brick, steel and plaster, every length of pipe must be perfect—a single leak may cause not only great expense but reflect seriously on the judgment of the Architect and Contractor who specified it.

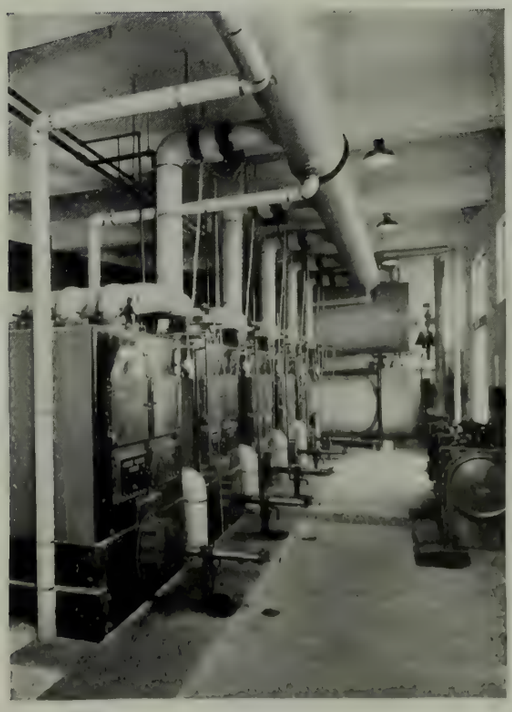
No one knows more thoroughly the great importance of good plumbing pipe than the manufacturers of "Spang" Steel Pipe. No pipe is more carefully made and more rigidly inspected—a policy of quality manufacture that has established "Spang" in the abiding confidence of the leading Architects and Building Contractors throughout industry.

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SPANG
WELDED STEEL PIPE



• In California's newest school



MODERN WARMTH protects the pupils

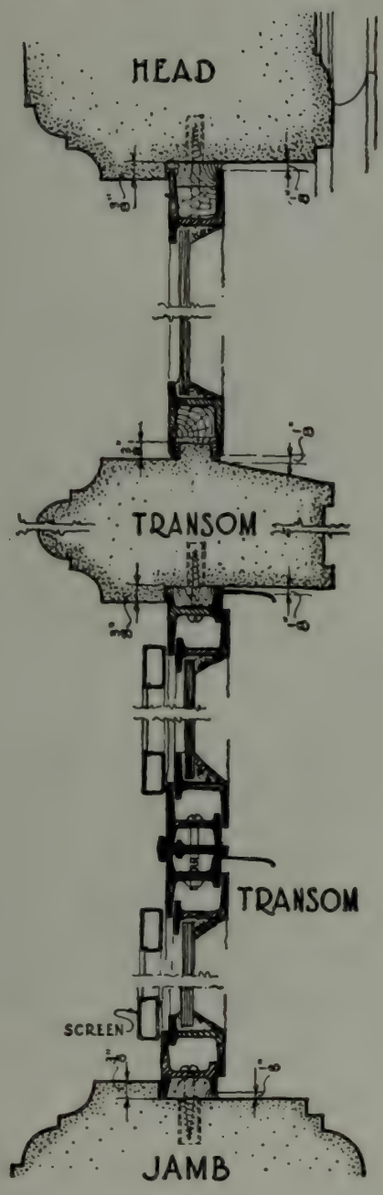
The new East Oakland High School is a fine example of the thorough planning and construction that goes into most public buildings today.

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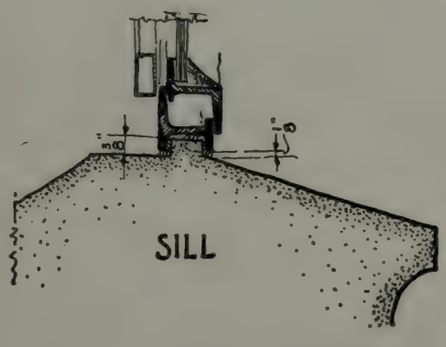
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The heavy construction favors glazing in leaded or plate glass where desired. Heavy, sherardized hinges fitted with 100% bronze bearings.

A new catalogue giving complete "Fencraft" details is now ready.

Fenestra

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DETROIT STEEL PRODUCTS COMPANY

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The Modernistic Movement—Plate 1

THIS interior of the Oklahoma Natural Gas Building at Tulsa, Okla., represents the modern trend in architecture. It was designed by A. M. Atkinson of Tulsa. The marble is Rose Tavernelle, with Belgian Black base and deal plates. It was finished in our Dallas shops and installed by their workmen.

VERMONT MARBLE COMPANY—PROCTOR, VERMONT

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See Sweet's Architectural Catalogues for Specifications and Other Data

VERMONT MARBLE

An Advertisement of APPRECIATION to ARCHITECTS



The H. B. Smith Company deeply appreciates the cooperation it receives from Architects. A compilation of all the specifications you have made in the past half century for H. B. Smith Boilers would make an impressive volume.

You are familiar with the success of the larger sizes (Mills "24", "34", and "44")—Do you know about the New Smith "16", our new sectional for small-to-medium homes? It is the heir of all the best features of our larger boilers. It stresses Fire Surface, the feature on which a boiler's efficiency chiefly depends.

The New Smith "16" has more Fire Surface than any other boiler made of the same grate area, and twice as much as some of them. It operates with equal success whether the fuel is oil, gas, coal or coke.

For complete information write for a free copy of our booklet, "The Smith 16". Address: The H. B. Smith Co., Dept. E-50, Westfield, Mass.

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The H. B. Smith Boilers for steam, hot water and vapor heating; radiators; and hot water supply boilers; for every type and size of private home, office building, factory and public building.

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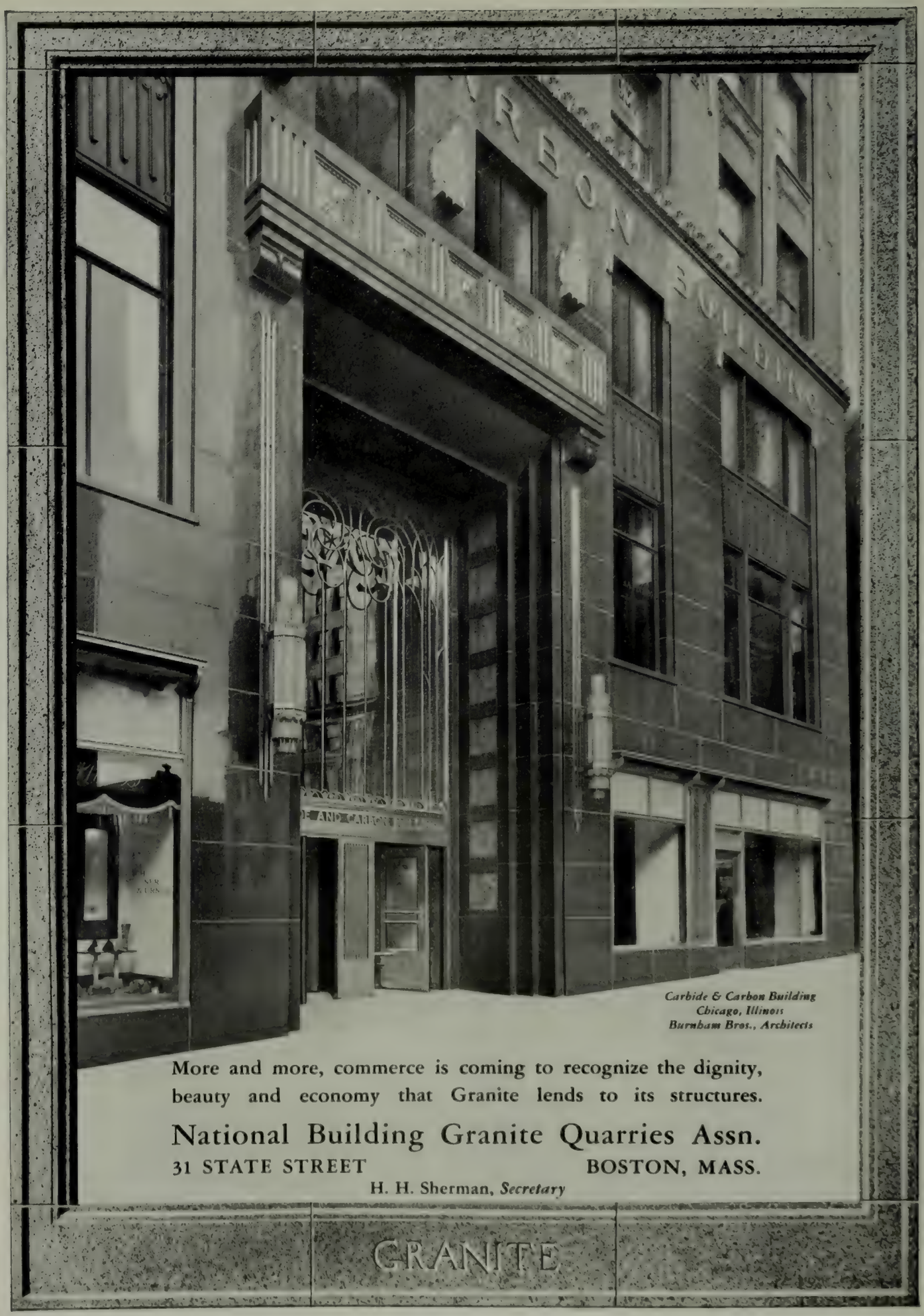
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More and more, commerce is coming to recognize the dignity, beauty and economy that Granite lends to its structures.

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H. H. Sherman, *Secretary*

GRANITE

Associated Business Papers, Inc., 1929 awards for editorial excellence

THE ARCHITECTURAL RECORD WINS FIRST PRIZE

In the class devoted to "Best Article, Series of Articles, or News Report" (in which there were 85 contestants), first prize has been awarded to Robert L. Davison, of the editorial staff of The Architectural Record, for the series of articles appearing in The Record under the general heading, "Technical News and Research."

(See full announcement on page 87)

Naturally THE ARCHITECTURAL RECORD is proud to be able to join in the congratulations due Mr. Robert L. Davison of its staff for winning the first prize, awarded by the Associated Business Papers, Inc., for the "Technical News and Research" series running in THE RECORD throughout 1929. (The announcement will be found on page 87).

What does "Technical News and Research" do?

It is an innovation in publishing which:

1. Presents, *every month*, a study of the best standard practice in one aspect of building.
2. Approaches the entire study always from the standpoint of *design*.
3. Concentrates on one central problem handled by the staff with the assistance of outside experts, instead of assigning the experts individual "subjects" however closely related. It therefore presents a single statement instead of several overlapping or conflicting ones.
4. Accepts editorial responsibility for its recommendations; does not content itself with publishing private views.
5. Gives what the staff member in charge of the study considers to be approved practice; where there is doubt, attempts to present the several possible solutions in orderly, succinct fashion.
6. Is in no way borne down by what already has been done by any single individual or group. Particularly in the field of construction methods, Technical News has often taken a position of positive leadership.



Technical News for June:

THE GASOLINE FILLING AND SERVICE STATION

BY K. LÖNBERG-HOLM

The series continues in 1930 with as much as we can give it of the same "timeliness, accuracy, thoroughness, originality, clearness of expression, and usefulness," upon which the prize was based. For the present issue Mr. K. Lönberg-Holm has analyzed the Gasoline Filling and Service Station. If this type of building has generally been turned over entirely to the engineer or to a construction department, perhaps this has been because the operators have held a mistaken view of the architect's work.

They have not generally trusted the architect to do more than to "style" the more "fancy" stations. But equipped with thorough knowledge of the problem the architect can do far more than surface "styling": *he alone* is able to combine in his design a thorough functional efficiency with observance of *community* rights and interests.

THIS STATION is one of a chain reaching from the Mexican border to Canada. It is expected by the promoters that each station in the chain will become the nucleus of a future town, as the inn and the blacksmith shop did in the past. Is not an architect needed in cases like this to make the design respect the community's rights?

THE JULY ARCHITECTURAL RECORD WILL INCLUDE:

Making Buildings Rainproof

One of the most important problems facing the architect today is how to insure rain-tight masonry walls. Mr. Stanley Newman, a specialist in this subject, analyses the causes of leaks in brickwalls and parapets, and offers several recommendations which affect specifications and erection methods. The Turner Construction Company and The Research Department of the Mellon Institute of Pittsburgh give supplementary data.

Vacation Houses on the Pueblo Rivera

Several houses of standard type and good concrete construction built to compete with the ordinary "cheap" houses. Rudolph Schindler, Architect.

Details of Brick Parapets

How to detail brick parapets so as to prevent leakage is demonstrated by detail drawings representing approved practice.

Theatre Construction, Heating, Ventilating, and Acoustics

Supplementing technical study of the theatre that appeared in the May issue is the new research on construction, heating, ventilating, acoustics and auditorium lighting. The two studies together will present the latest and most complete architectural study of the present-day theatre yet available in this country.





Associated Business Papers, Inc., 1929 awards for editorial excellence

THE ARCHITECTURAL RECORD WINS FIRST PRIZE

In the class devoted to "Best Article, Series of Articles, or News Report" (in which there were 85 contestants), first prize has been awarded to Robert L. Davison, of the editorial staff of The Architectural Record, for the series of articles appearing in The Record under the general heading, "Technical News and Research."

The outstanding qualities which won FIRST PRIZE are indicated in the conditions governing the contest, which state "the Jury will be guided broadly by the timeliness, accuracy, thoroughness, originality, clearness of expression and usefulness as displayed by the particular article or series of articles, etc."



The Technical News and Research section of The Record, inaugurated with the January, 1929, issue, is a new departure in publishing—a creative service designed to meet a pressing need of the architectural profession. It consists of monthly analytical studies, in exhaustive detail, of building problems in relation to specific types of construction; each study verifies and correlates a mass of practical information, elsewhere virtually unobtainable but of a kind urgently needed by the architect for his daily work—although he cannot spare time for the protracted research necessary to assemble it. The studies provide manufacturers with a new avenue of contact with architects, suggest new uses for materials, and simplify the problems of production and marketing by indicating where architects employ products to the best advantage.

The ARCHITECTURAL RECORD

A Dodge publication — 119 West Fortieth Street, New York, N.Y.

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Authentic PLASTER ORNAMENT



TILLION & TILLION
Architects

Effective use of Woodkast in Manhattan Towers *Chancel*

THE architects of Manhattan Towers, the new twenty-three story church and apartment hotel in New York, were confronted with a problem of materials in the design of the chancel. A rich effect of English Gothic wood carving was the one they sought to obtain. Natural wood could not be used because of its excessive cost, so a composition was sought which would be both dignified and durable.

The choice of Jacobson's Woodkast was a fortunate one. With this medium, the rich effect of a profusion of English Gothic carving was obtained at not too great expense and with the minimum of fire risk.

Woodkast is a composition material developed after years of experiment to simulate either old or new wood, in any open grain. In our latest catalogue are pictured a number of designs in which Woodkast is available, many of them reproduced from authentic examples of fine old wood carving. In case none of these are suitable for a particular job, new models can be made at a nominal charge.

JACOBSON & COMPANY
239-41 East 44th Street
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FRONTISPIECE

A MID-TOWN BANKING BRANCH
for the Title Guarantee and Trust Co.,
New York City

JOHN MEAD HOWELLS, ARCHITECT



A MID-TOWN BANKING BRANCH

TITLE GUARANTEE AND TRUST CO., NEW YORK CITY

JOHN MEAD HOWELLS, ARCHITECT

THE ARCHITECTURAL RECORD

AN ILLUSTRATED MONTHLY MAGAZINE OF ARCHITECTURE & THE ALLIED ARTS & CRAFTS

VOLUME 67 JUNE · 1930 NUMBER 6

A MID-TOWN BANKING BRANCH

for the Title Guarantee and Trust Company, New York City

JOHN MEAD HOWELLS, ARCHITECT

THE BUILDING

A twenty-story office building of light brick with stone trim.

•

THE ENTRANCE

The appearance of weight, which frequently dominates entire bank facades, has here been confined to the entrance, which is framed in black Swedish granite. (See page 504). The officers of the bank work behind spacious windows.

•

THE BANKING ROOM: PLAN

Although the public space in the banking room is in the center of the building (see plan on page 502) yet the narrow lot necessitates that the elevator lobby occupy one side. To give the illusion of greater width, the architect has carried the bank screen motif around this side wall suggesting a space behind it (see page 502), and he has also placed mirrors in the partition above the tellers' cages.

•

LIGHTING

This banking room is lighted entirely by indirect light, reflected from the ceiling, which is covered with Dutch metal leaf of a silver appearance. The long lighting fixtures are hung close to the ceiling and reflect directly against it.

•

MATERIALS

The ceiling of rough plaster covered with metal leaf; the bank screen of chrome-plated bronze with simple vertical fluting in Benedict metal (which is slightly yellow, and relieves the silver whiteness of the screen). Lower part of wall in marble without mouldings or carving.





A MID-TOWN BANKING BRANCH

TITLE GUARANTEE AND TRUST CO., NEW YORK CITY

JOHN MEAD HOWELLS, ARCHITECT

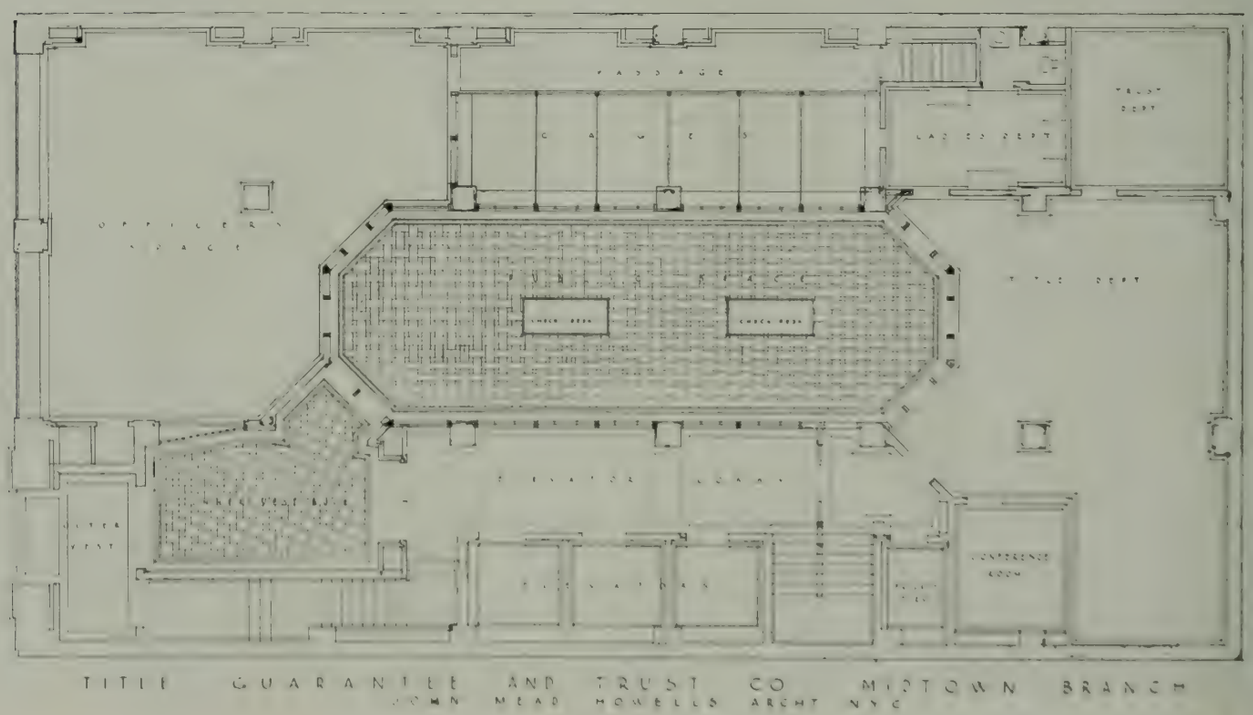


STREET FRONT, A MID-TOWN BANKING BRANCH

TITLE GUARANTEE AND TRUST CO., NEW YORK CITY

JOHN MEAD HOWELLS, ARCHITECT





INTERIOR, A MID-TOWN BANKING BRANCH

TITLE GUARANTEE AND TRUST CO., NEW YORK CITY

JOHN MEAD HOWELLS, ARCHITECT



A MID-TOWN BANKING BRANCH

TITLE GUARANTEE AND TRUST CO., NEW YORK CITY

JOHN MEAD HOWELLS, ARCHITECT

This view shows the long lights hung close to the ceiling. The mirrors on the wall give the effect of a continuation. The room is narrow and the architect felt the need of suggesting added space.



ENTRANCE, A MID-TOWN BANKING BRANCH
TITLE GUARANTEE AND TRUST CO., NEW YORK CITY
JOHN MEAD HOWELLS, ARCHITECT

THE RICHFIELD BUILDING, LOS ANGELES

MORGAN, WALLS AND CLEMENTS, ARCHITECTS

PLAN FEATURES

Located on the corner of Sixth and Flower Streets, this building takes account of increasing city traffic congestion by the inclusion of a large garage covering two entire floors of basement space, where tenants may park their cars and take an elevator directly to their offices.

A large part of this building is to be occupied by the executive and general offices of the Richfield Oil Company.

On the twelfth floor is a large amusement room provided with a stage; adjacent to it a fully equipped restaurant kitchen and cafeteria making possible daily service to all employes. On this floor also are private dining rooms for business luncheons and the executive suites on the floor below are served by means of a dumb-waiter to a pantry and luncheon or dining room. The twelfth floor includes barber shops, lavatories, a ladies' lounge room.

•

BEACON AND FLOODLIGHTING

A beacon tower about 130 feet high carries a searchlight for guiding airplanes. The entire building is floodlighted at night.

•

EXTERIOR TREATMENT

The walls are black to prevent undue contrast with countless windows which might destroy the mass or silhouette. The terra cotta wall surfaces are broken by countless shallow vertical flutes or ribs 1½ inches wide, to catch highlights. The gold ornamentation is of terra cotta coated with a layer of finely pulverized gold, held in suspension in a transparent glazing solution.

•

SPANDRELS

The verticality of line of the building is accented by keeping all floor spandrels back of the general wall surface, thus producing the effect of single, vertically slotted, windows running from the second to the twelfth floor. Immediately behind the glass panes of the windows at the floor lines, metal and thin concrete backing permit this feature without sacrificing floor space.

•

SCULPTURE

By Mr. Haig Patigian, all in one way or another symbolizing motive power.

•

INTERIOR

The vestibule is in Belgian black marble, with trimmings in Cardiff green, and metal work in Russian bronze. The elevator doors of etched metal run from floor to ceiling.

•

MODELS

After the general design had been determined, a ⅛-inch scale model was made; by photography it was pictured on the site in true relation to existing structures around it. These composite photographs, taken from several points of view, made possible a study from many angles.



Photo. Keystone

GRILL IN MAIN ENTRANCE



THE RICHFIELD OIL BUILDING, LOS ANGELES

MORGAN, WALLS AND CLEMENTS, ARCHITECTS



CORRIDOR ON ONE OF THE UPPER FLOORS

RICHFIELD OIL BUILDING, LOS ANGELES

MORGAN, WALLS AND CLEMENTS, ARCHITECTS



Photo. Keystone

STAIR DOOR IN MAIN LOBBY

RICHFIELD OIL BUILDING, LOS ANGELES

MORGAN, WALLS AND CLEMENTS, ARCHITECTS



Photo. Berne

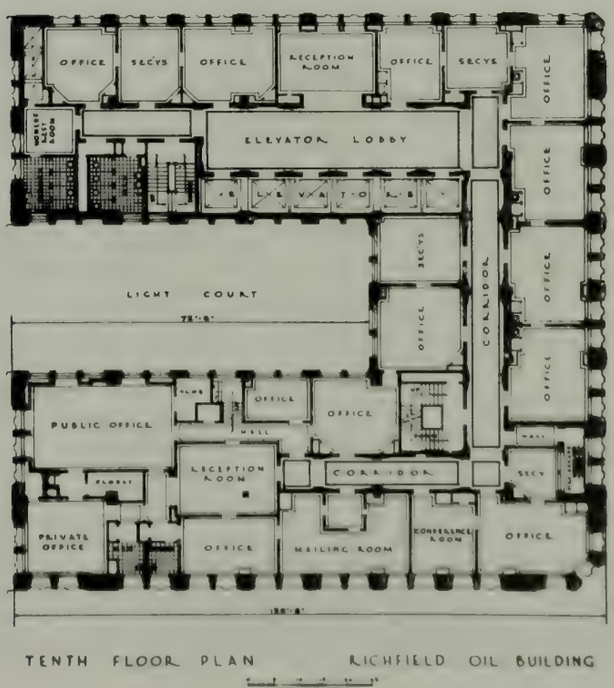
TERRA COTTA FIGURES AT FIRST SET-BACK

RICHFIELD OIL BUILDING, LOS ANGELES

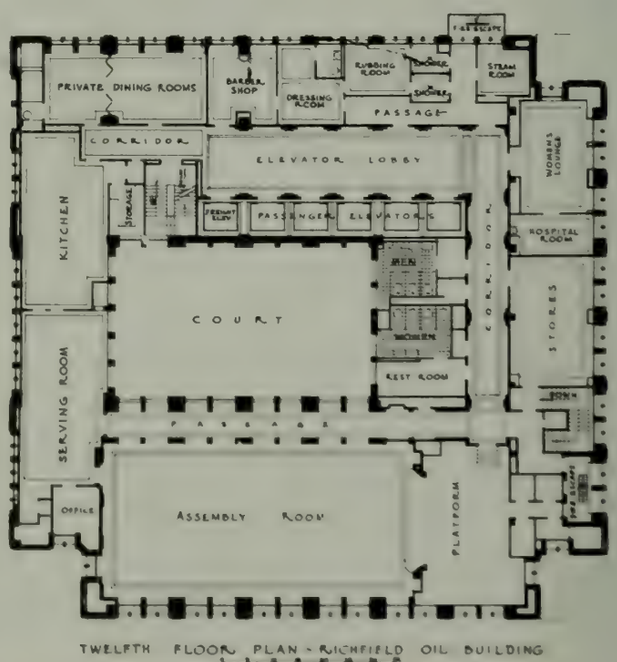
MORGAN, WALLS AND CLEMENTS, ARCHITECTS



PRIVATE OFFICE



TENTH FLOOR PLAN RICHFIELD OIL BUILDING



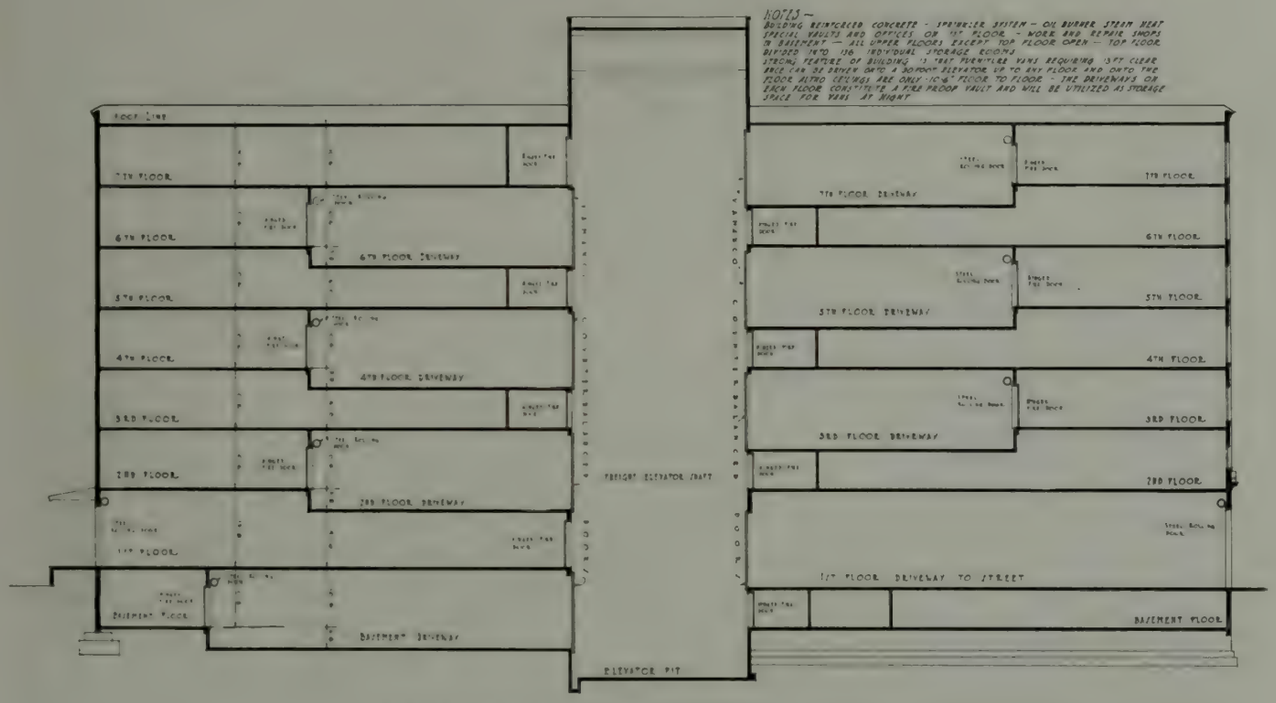
TWELFTH FLOOR PLAN - RICHFIELD OIL BUILDING

RICHFIELD OIL BUILDING, LOS ANGELES

MORGAN, WALLS AND CLEMENTS, ARCHITECTS

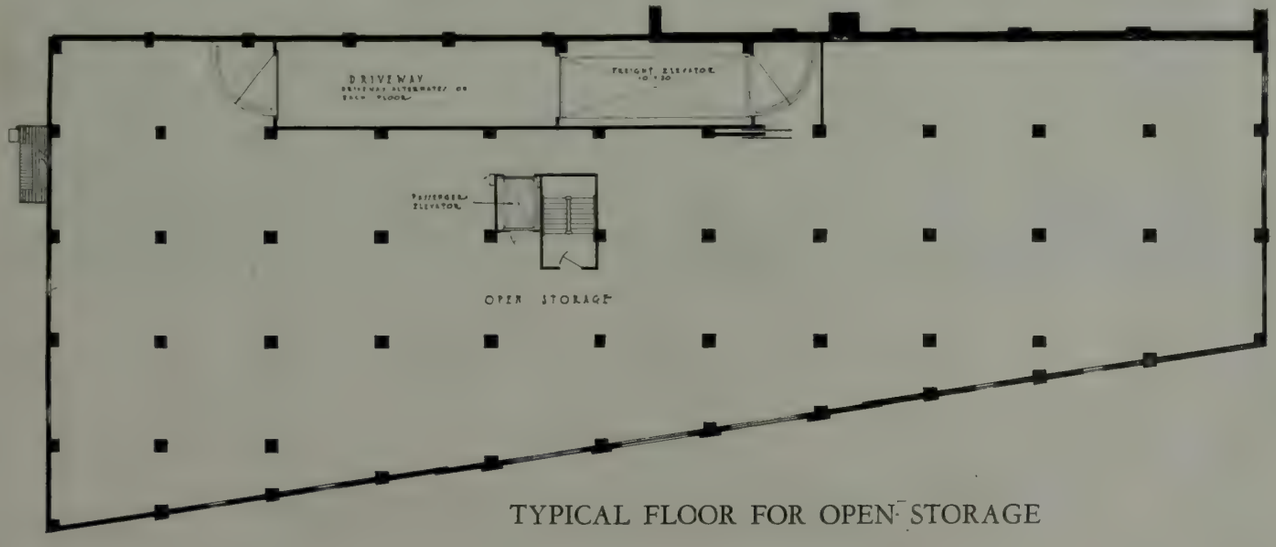
THE "SECURITY" STORAGE WAREHOUSE, PORTLAND, ORE.

C. A. HOUGHTALING, ARCHITECT

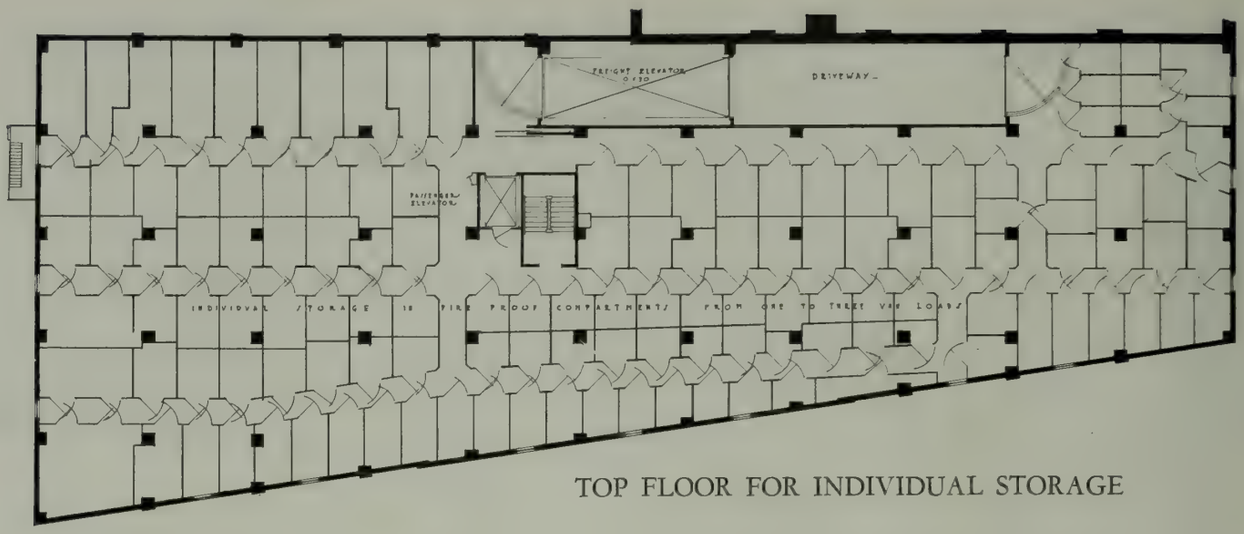


LONGITUDINAL SECTION THRU DRIVEWAYS

The section printed above shows the remarkable feature of this building, which is the system whereby big vans are unloaded on the upper floors. Driveways of 13-foot clearance are built into every story, although the building itself is only 10 feet 6 inches high from floor to floor. A 30-foot elevator unloads the vans on these driveways, which are built as fireproof vaults to store the vans overnight.



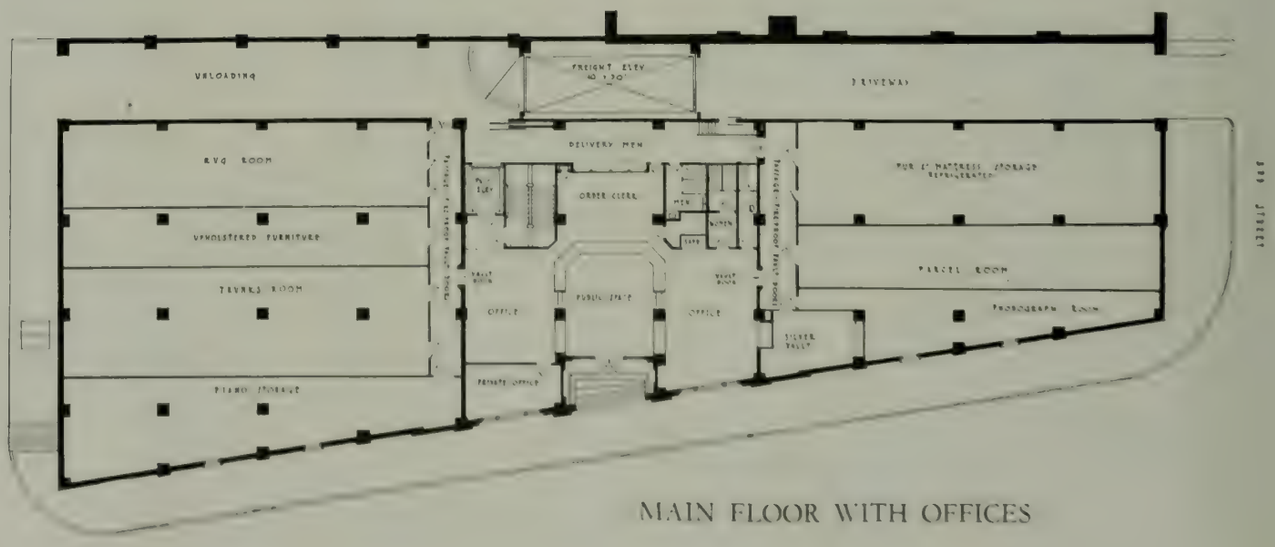
TYPICAL FLOOR FOR OPEN STORAGE



TOP FLOOR FOR INDIVIDUAL STORAGE

The top floor (shown above) is divided into 136 individual storage rooms; all the other upper floors are open, as shown on the plan above. Special vaults and offices are on the first floor; work and repair shops in the basement.

The building is of reinforced concrete; it is equipped with oil burners, steam heat, and a sprinkler system. It is 7 stories high, with dimensions of 200′ by 50′ at one end and 80′ at the other.



MAIN FLOOR WITH OFFICES

PORTFOLIO OF CURRENT ARCHITECTURE



Photo Wallace

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS

FEATURING FOUR HOUSES



Photo Wallace

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS

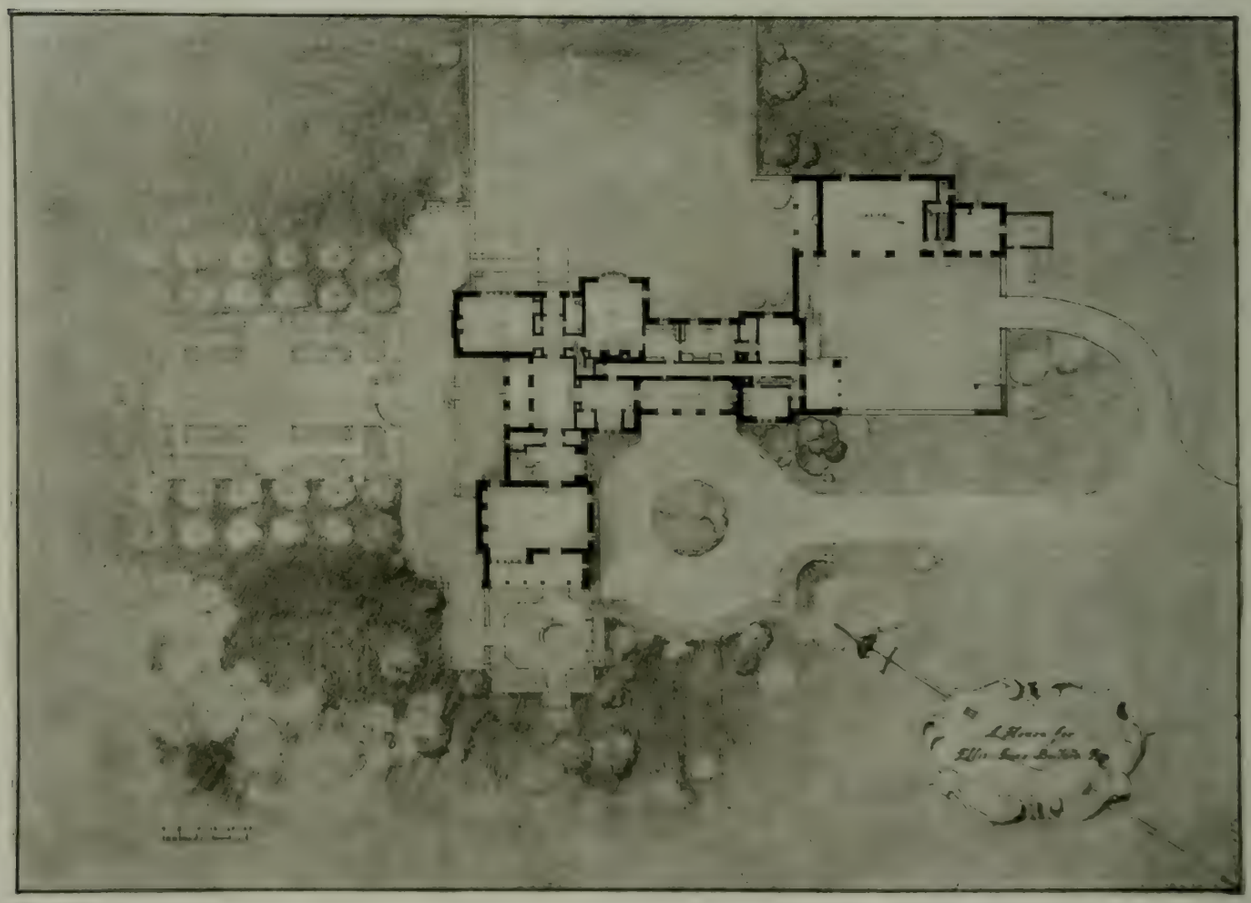


Photo. Wallace

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS



Photo. Wallace

SERVICE WING

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS



Photo. Wallace

LOGGIA

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS



Photo. Wallace

LIVING ROOM PORCH

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS



Photo Wallace

LIBRARY

HOUSE OF ELLIS AMES BALLARD AT CHESTNUT HILL, PA.

THOMAS, MARTIN AND KIRKPATRICK, ARCHITECTS



Photo. Kammerdiener

ENTRANCE

HOUSE OF ROLLIN C. CHAPIN, ARCHITECT, MINNEAPOLIS, MINN.



Photo. Kammerdiener

HOUSE OF ROLLIN C. CHAPIN, ARCHITECT, MINNEAPOLIS, MINN.



Photo Kammerdiener

THE STUDY

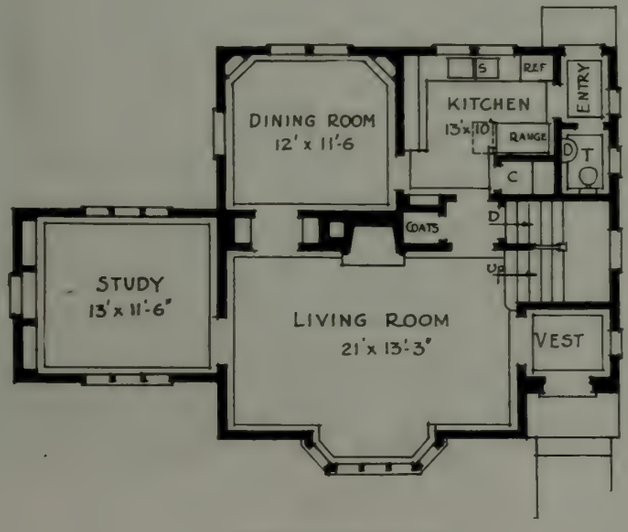
HOUSE OF ROLLIN C. CHAPIN, ARCHITECT, MINNEAPOLIS, MINN.



Photo. Kammerdiener

KITCHEN

HOUSE OF ROLLIN C. CHAPIN, ARCHITECT, MINNEAPOLIS, MINN.



FIRST FLOOR PLAN



SECOND FLOOR PLAN



HOUSE OF MR. AND MRS. ALLYN K. FORD, MINNEAPOLIS, MINN.
CLARENCE WILSON BRAZER, ARCHITECT

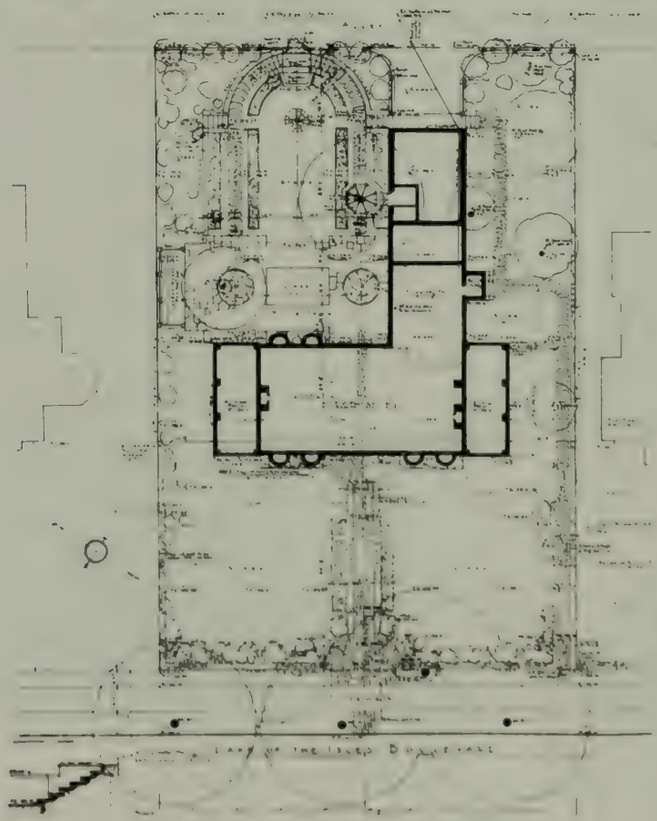


MAIN ENTRANCE

HOUSE OF MR. AND MRS. ALLYN K. FORD, MINNEAPOLIS, MINN.

CLARENCE WILSON BRAZER, ARCHITECT





PLOT PLAN

GARDEN

HOUSE OF MR. AND MRS. ALLYN K. FORD, MINNEAPOLIS, MINN.

CLARENCE WILSON BRAZER, ARCHITECT



Photo. Connell.

HOUSE OF LOUIS SAMUEL,
LOS ANGELES, CAL.

LLOYD WRIGHT, ARCHITECT

"One of the lightest of all reinforced concrete buildings for the purpose ever designed and built."
(See text on page 530.)

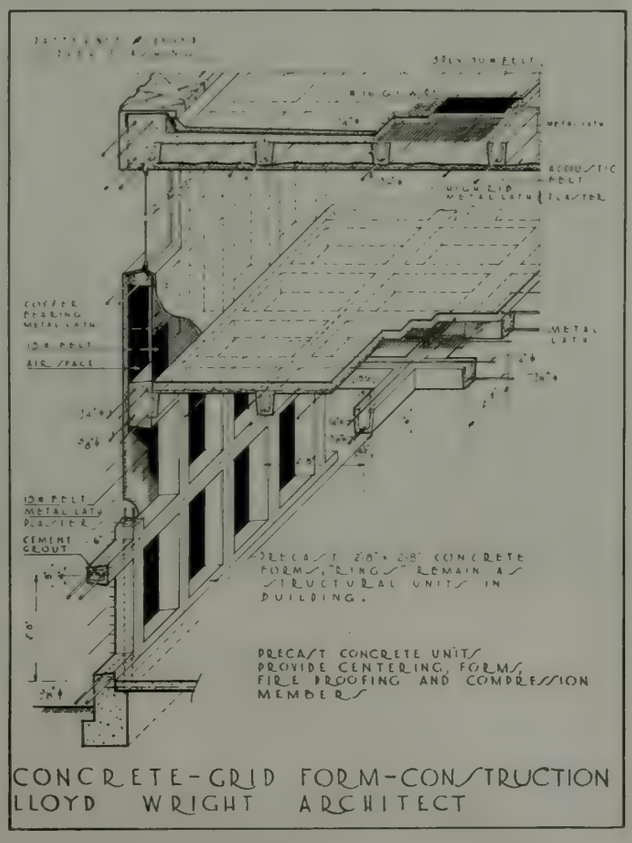




Photo. Connell

VIEW FROM LIVING ROOM TOWARD LOUNGE

HOUSE OF LOUIS SAMUEL, LOS ANGELES, CAL.

LLOYD WRIGHT, ARCHITECT



Photo. Connell

LIVING ROOM

HOUSE OF LOUIS SAMUEL, LOS ANGELES, CAL.

LLOYD WRIGHT, ARCHITECT



Photo Gibbs

LIVING ROOM

HOUSE OF LOUIS SAMUEL, LOS ANGELES, CAL.

LLOYD WRIGHT, ARCHITECT

THE SAMUEL HOUSE, LOS ANGELES

LLOYD WRIGHT, ARCHITECT

AN ELEGANT SOLUTION

It is fortunate for the development of the new architecture that the genius for three-dimensional proportion continues so potently in Lloyd Wright the son, whose accomplishment in the Samuel residence in Los Angeles carries on a sequence of structural simplification. It presents a thorough and sound approach to what the mathematicians called "the elegant solution"; that is, a solution stripped of the redundant, keen in the broader sense, appropriate in the exactitude of its structure.

•

STRUCTURE

The mechanics of the place involve a simplicity of structural scheme unachieved until now outside of Europe, possibly not there: a residence of reinforced concrete, glass, and metal throughout—walls, floors, ceilings, roofs, girders, foundations, doors, windows, and radio antennae included. No wood has been used except during construction for a certain limited amount of temporary scaffolding to support the unique precast molds.

And they are unique. Here again, for the first time, the forms carrying the steel and cement grout which weave the building together, making it an integral monolith, were not of wood but of concrete. This in turn shapes the skeleton and acts as a rust- and fire-proof covering for the steel reinforcement.

The structural steel and iron are covered by a sheath of concrete, which at the first glance would seem to indicate a weighty construction; but this is actually lighter, in the quantity of materials used for an equivalent structural strength, than any class-A building yet executed in this country. Probably the lightest, by one half, of all reinforced concrete buildings for the purpose ever designed and built.

Wherever the porous concrete would not resist moisture, or where metal is exposed to air or moisture, copper flashing has been used, woven over, round, and through, the building in a rhythmic pattern. The same covers doors, windows, fireplace, hood, and heaters. This interweaving, together with the flow of the structural masses, serves to establish an intense harmony of the whole.

•

FINISH

The essential nature of the materials has here been honorably dealt with. No paint has been used. The colors are all inherent in the materials inside and out, the result of chemical changes: aggregate-colored plaster, verde-green copper, and clear glass.

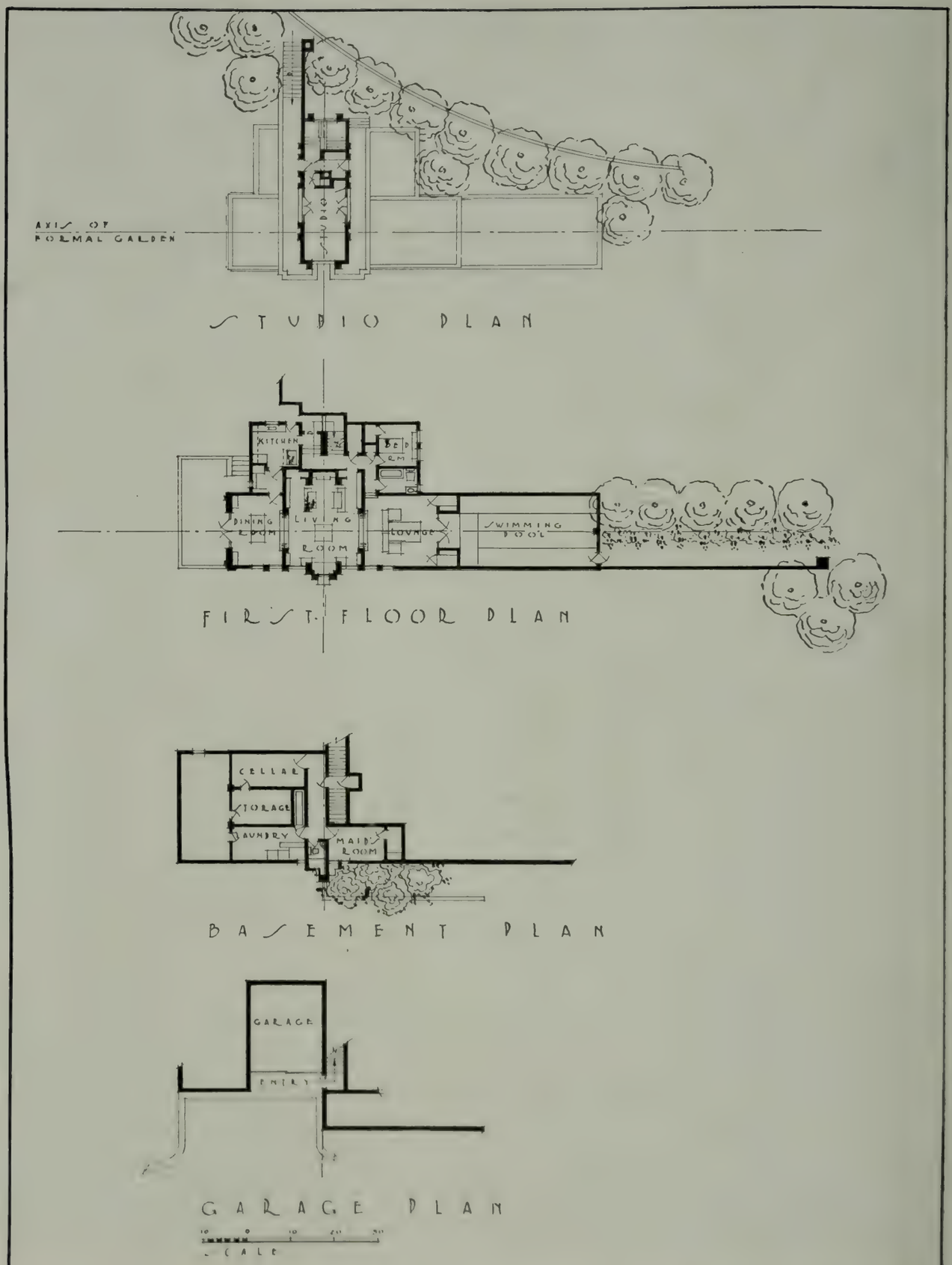
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SOCIAL USE

The problem of the double functioning of the home has been well met. It must intimately serve the comfort of a small and private group; yet it is also upon occasion to expand to receive guests in large number. And the Samuel house does astonishingly expand and contract. The great room can be thrown open on two sides upon garden and swimming pool; it flows out to paved roofs of varying levels. The house is in fact made to be enjoyed on its upper surfaces as well as inside. The steep hillside slope into which the structure is locked and knit has made possible a design in which the major rooms open out upon garden, pool, or terraces which roof the rooms below; so that life is no longer lived in boxes, but establishes, in and from every part, a relation with the elements and the terrain.

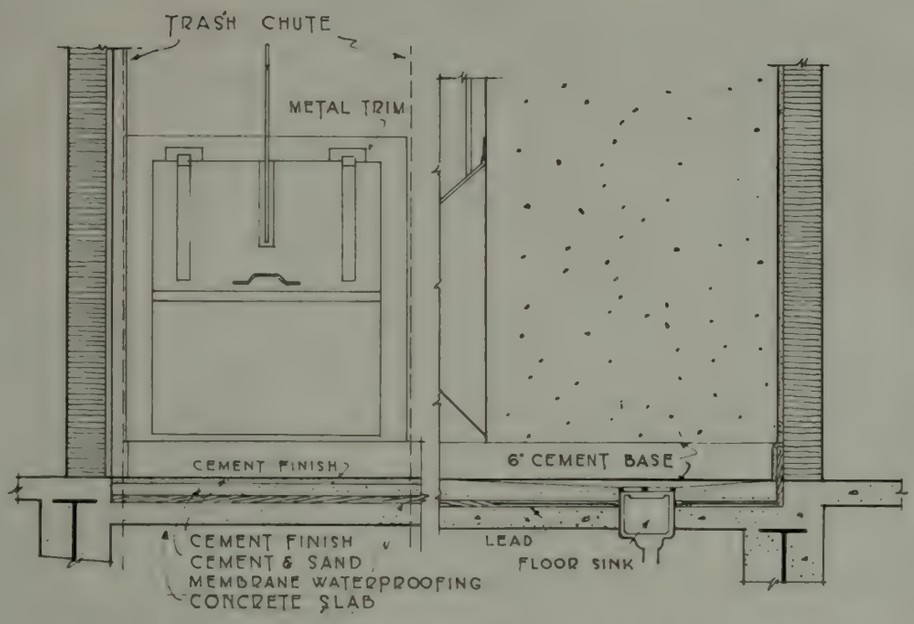
The building fits its place as roots fit earth and tree. Presenting an environmental sheath for a family whose particular desires and life-concepts the architect has deeply considered, it does to a high degree make possible the kind and quality of life they have desired.

PAULINE G. SCHINDLER.

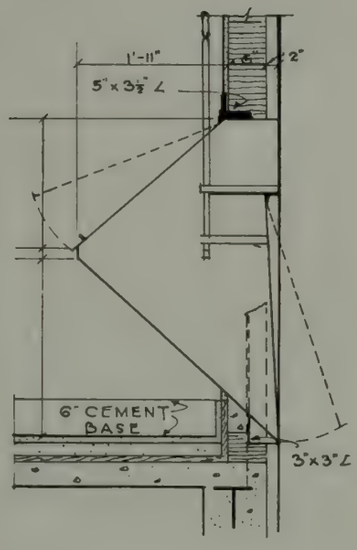


LOUIS SAMUEL RESIDENCE — LLOYD WRIGHT ARCHITECT

NOTES ON DRAFTING AND DESIGN



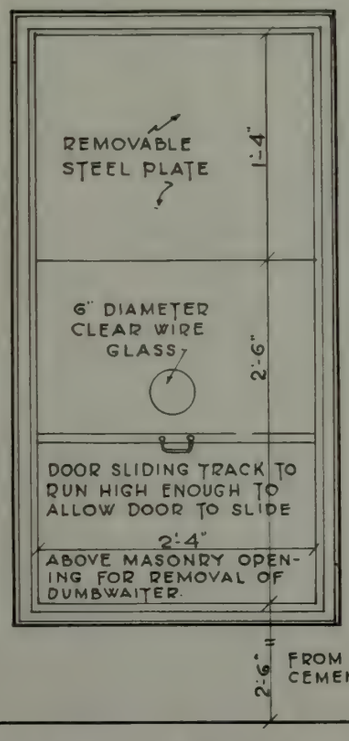
DETAIL OF TRASH CHUTE



SECTION

TRASH CHUTE TO BASEMENT

Last month we illustrated a design for a drinking fountain with a chute to the basement for discarded drinking cups. The same principle of "Chute to basement" may be applied for the accumulated paper and refuse in office and public buildings. The trash chute illustrated is placed in janitor's closet in hallway and was detailed by Starret and Van Vleck, Architects, New York.



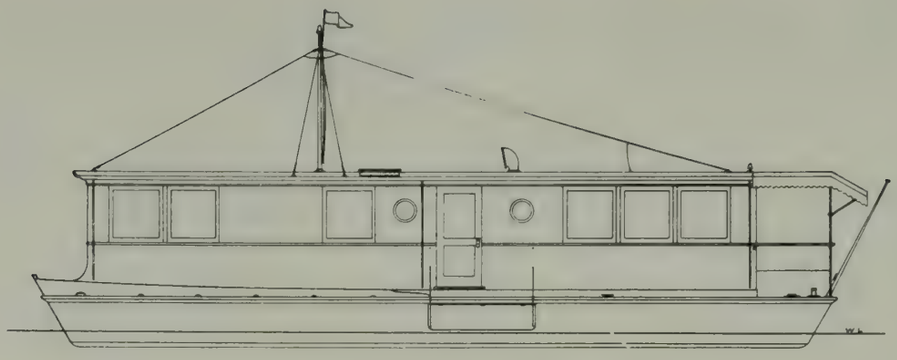


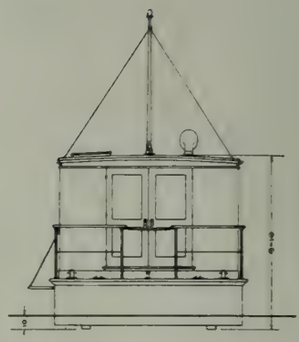
SECTION

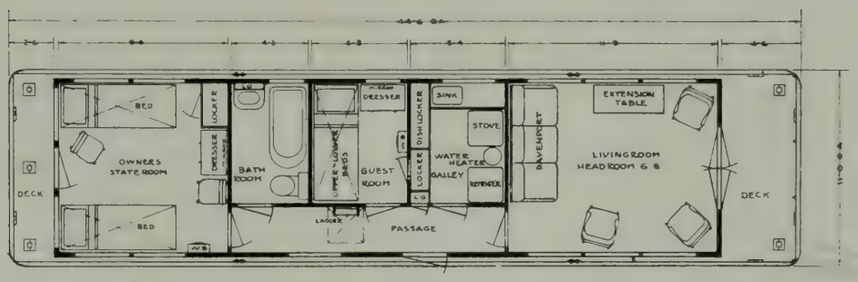
DETAIL OF DUMBWAITER

IMPROVING THE DUMBWAITER

Because of fire hazard and for wear and tear, the dumbwaiter installed in apartment houses and restaurants should be of steel. The detail shown opposite is an accepted standard size and height above floor. Starret and Van Vleck, Architects.





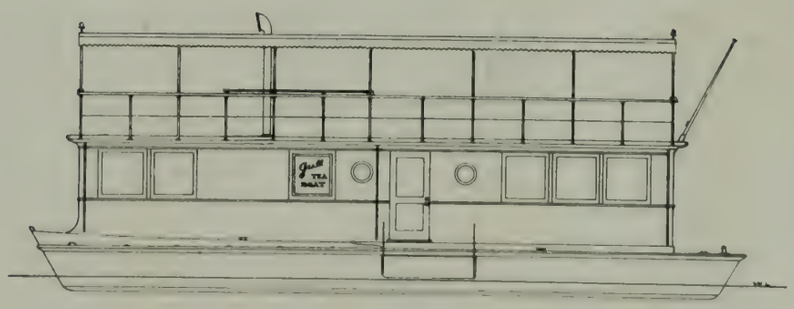


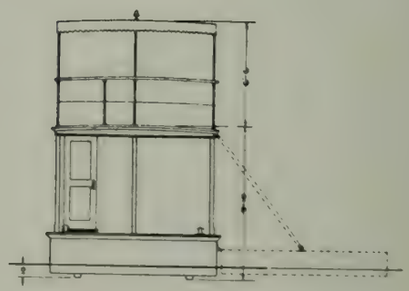
Courtesy. American Boat Corp

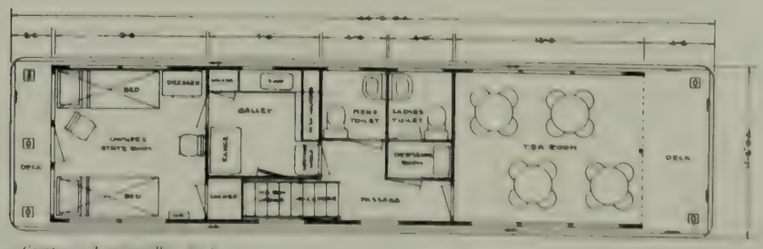
HOUSE BOAT

A summer house on the water, capable of being moored in different places, can be designed by the architect. This compact houseboat with complete living quarters and deck space costs slightly over three thousand dollars.

(In the August issue of the *Record* will be a treatment of "Week-End Houses.")







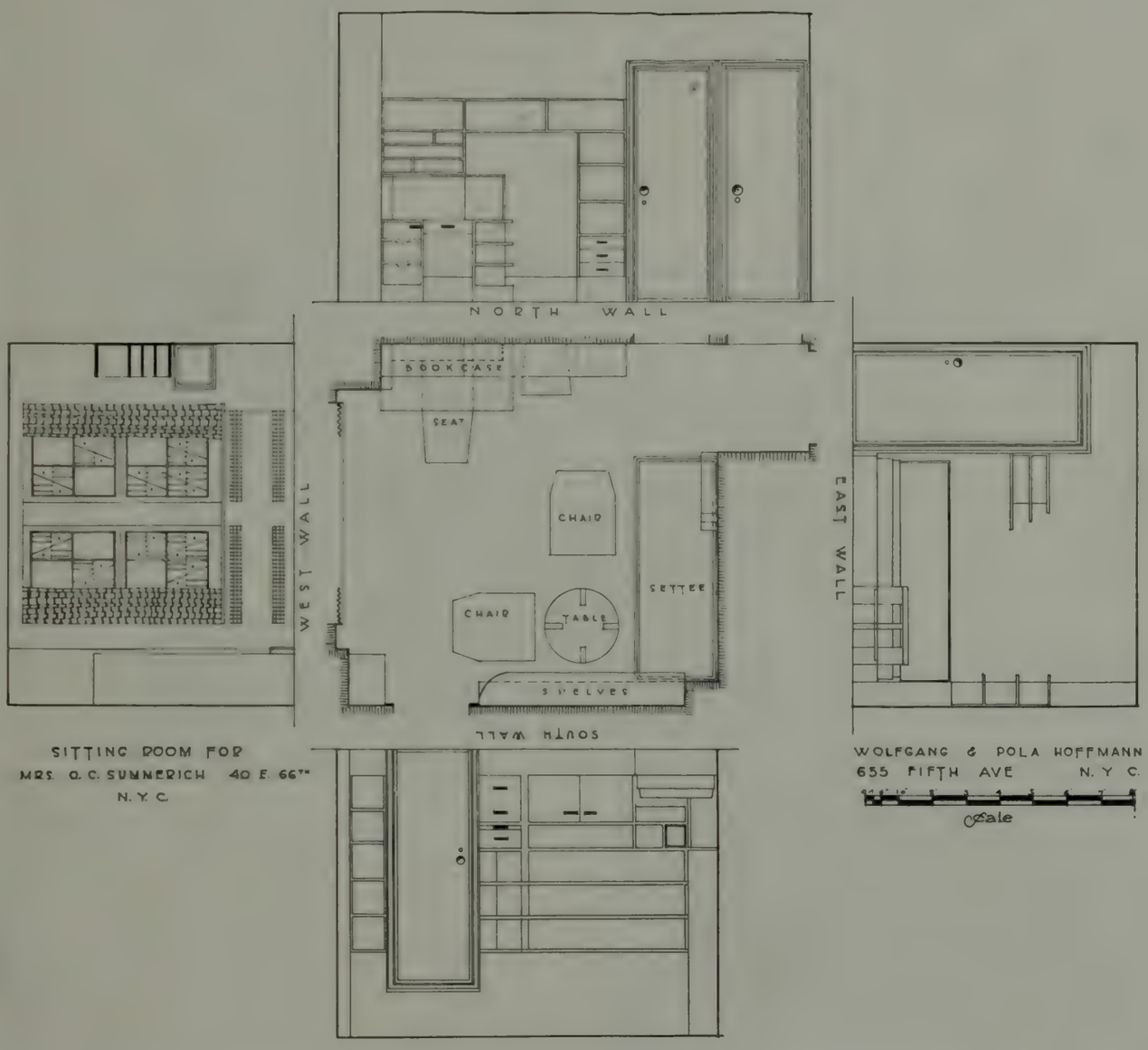
Courtesy. American Boat Corp.

FLOATING TEA HOUSE

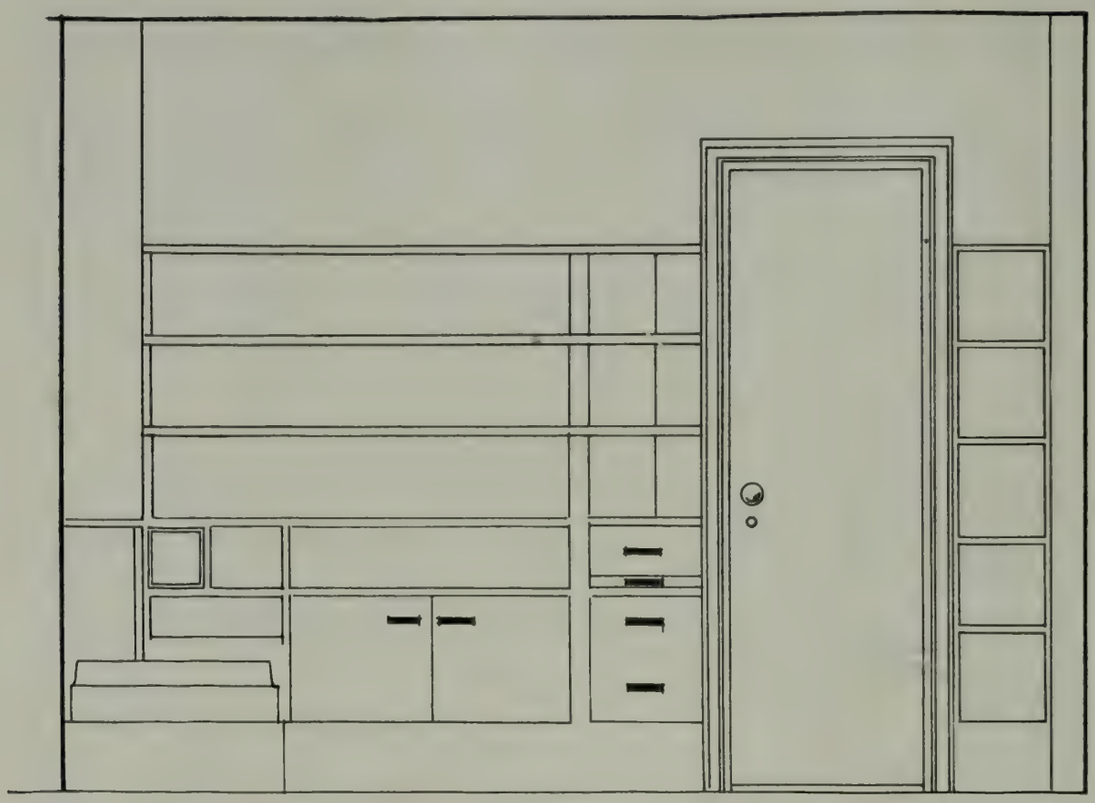
This tea house on the water requires no real estate and may serve on an estate for private entertainment or for a tea-room business. There is space for four tea tables in the cabin and many others on the upper deck, 11′ x 45′.

A COMPACT LIVING ROOM

WOLFGANG AND POLA HOFFMANN, ARCHITECTS



IN AN APARTMENT FOR MRS. O. C. SOMMERICH, NEW YORK CITY



SOUTH WALL
ELEVATION



VIEW OF SOUTH SIDE

A COMPACT LIVING ROOM

WOLFGANG AND POLA HOFFMANN, ARCHITECTS

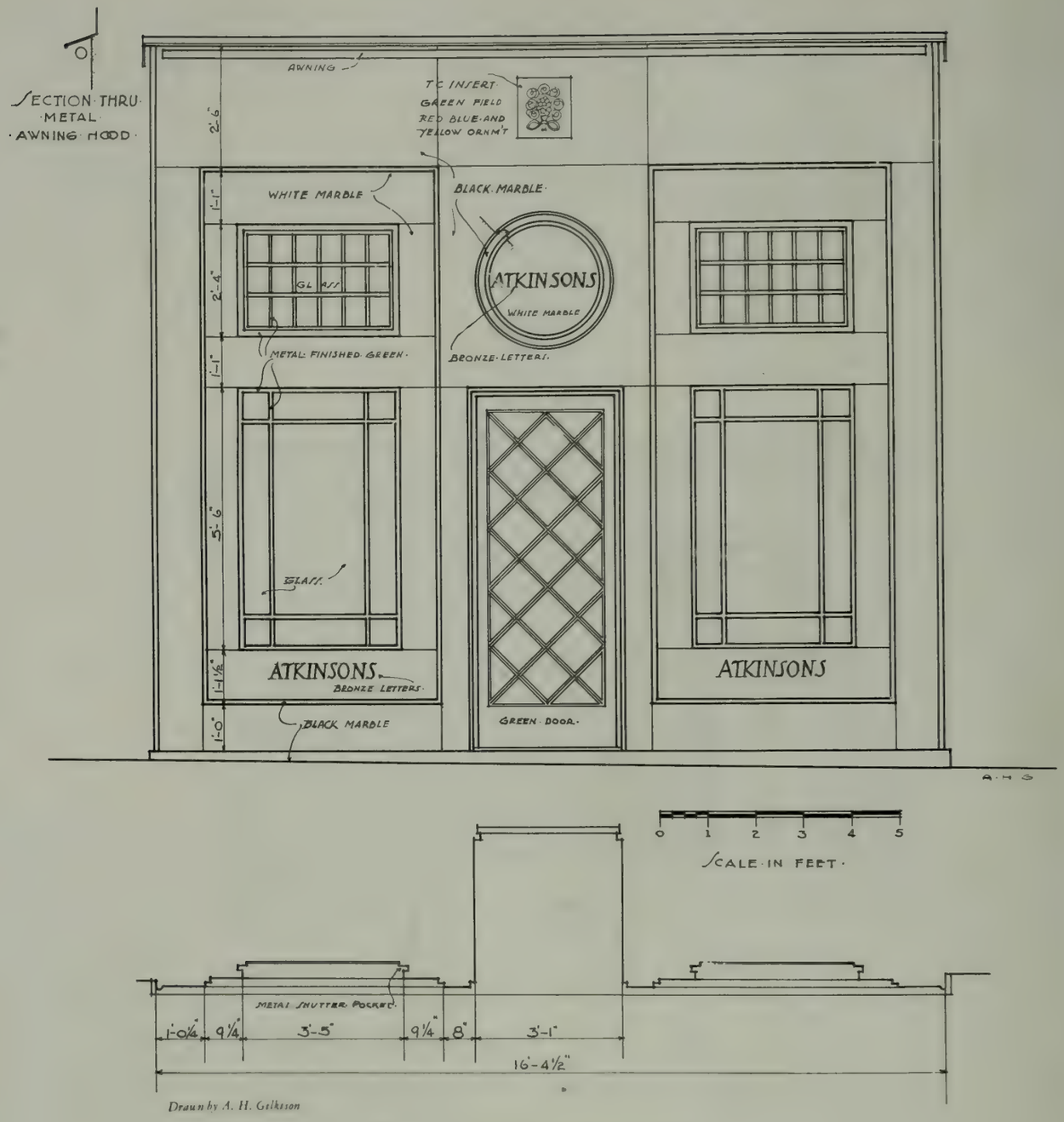
Two views of this room were published in the March issue of The Architectural Record. The floor plans and alterations published herewith show how a remarkably economical use of space was achieved. The desk, shelves, and cabinet, are painted lobster color; the walls are silver, the rug and curtain in shades of lobster and gray; the chair and couch upholstered in yellow lacquered cloth.

DETAILS OF CURRENT ARCHITECTURE



FOUR DRAWINGS BY A. H. GILKISON

Above: The Bianca Shop, Paris. An inexpensive front of wood with metal trim and letters. The incised lines are U-shaped grooves, gilded



DETAILS OF CURRENT ARCHITECTURE

A PERFUME SHOP, RUE DE LA PAIX



Drawn by A. H. Gilkison

DETAILS OF CURRENT ARCHITECTURE

A PERFUME SHOP, RUE DE LA PAIX

White and black walls. Green terra cotta insert with colored flowers in relief. Metal work of bronze



Drawn by A. H. Gilkson

DETAILS OF CURRENT ARCHITECTURE

A SHOP FRONT, NEAR RUE DE LA PAIX

With light colored marble,
bronze letters, metal trim

THE CITROËN AUTOMOBILE SALES BUILDING, PARIS

By C. THEODORE LARSON

LAPRADE AND BAZIN, ARCHITECTS



THE PSYCHOLOGY OF THE DESIGN

Efforts to concentrate the attention of shoppers on a sales commodity have often consisted of suppressing the area of window glass on the facade and displaying to the street only a small vase or perhaps a pair of shoes. In this case the whole facade becomes a gigantic show window, six stories high and proportionally wide. At the first glance the man in the street sees automobiles of all types, some fifty models, on display before him, ready for selection and delivery. If the impulse is to purchase a car, as intended, side portals flanking the window allow the prospective customer to drive in with his ancient vehicle and leave with a new model.

The automobiles are displayed on the ground floor and the five cantilevered balconies.

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SERVICE CONTROL

An older building exists in the rear, extending through the block to another street. This is used as a storage garage, with ramps leading to the upper floor, and is directly connected with the newer part, reserved exclusively for display and sales. Between the two parts, on the main floor, are located the administration offices and the service department, housed inside glass partitions with special ventilation. Incoming and outgoing cars are easily checked.

ROOF TERRACE

In conjunction with the sales and service departments, a driving school is maintained by the agency. The roof terrace is utilized for this purpose, being laid out with small streets and curb lines where the novice can practice making turns, and where automobiles can be tested.

•

CONSTRUCTION

The central window is of plate glass, 53′ 6″ high and 68′ 2″ wide. It is reinforced against wind pressure by two vertical trusses designed for uniform resistance. To give scale to this large window the architects have framed it by two flanking and slightly projecting bays with horizontal fenestration at each floor level.

The framing is steel, with reinforced concrete for the floors and walls. The interior supports are surrounded by sheet metal, painted black and furred out to give the columns a more massive appearance.

•

COLOR SCHEME

The concrete is a light buff. The columns as well as the metal balustrades on the cantilevered balconies are painted black, an artifice that makes them less visible and emphasizes all the more the horizontality of the floors. The doors of the elevator shaft, located in the stair well, are painted a vermilion red, in contrast with the black.

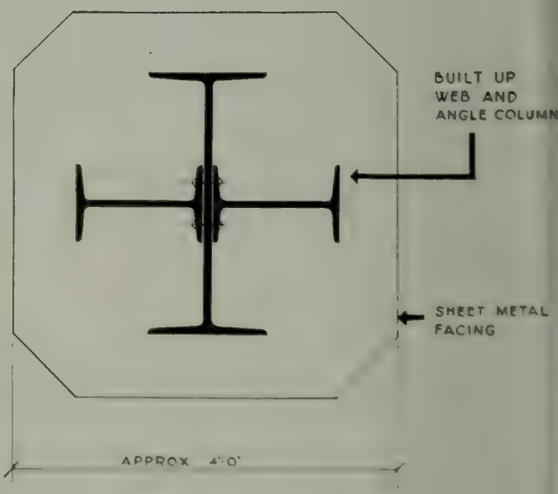




CITROËN SALES BUILDING,
PARIS

LAPRADE AND BAZIN, ARCHITECTS

"A show window 6 stories high
and 68 feet wide"



DETAIL OF COLUMN WITH
FALSE FACING



CITROËN SALES BUILDING, PARIS

LAPRADE AND BAZIN, ARCHITECTS

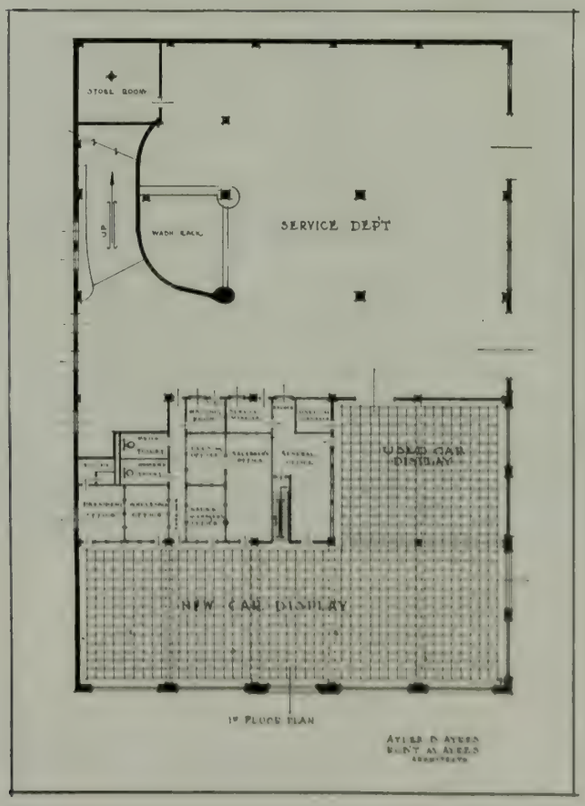
"At first glance the man in the street sees 50 models." (Text on page 539)



Photo. Patteson

PACKARD MOTOR CAR COMPANY, SAN ANTONIO, TEXAS

ATLEE B. AYRES AND ROBERT M. AYRES, ARCHITECTS



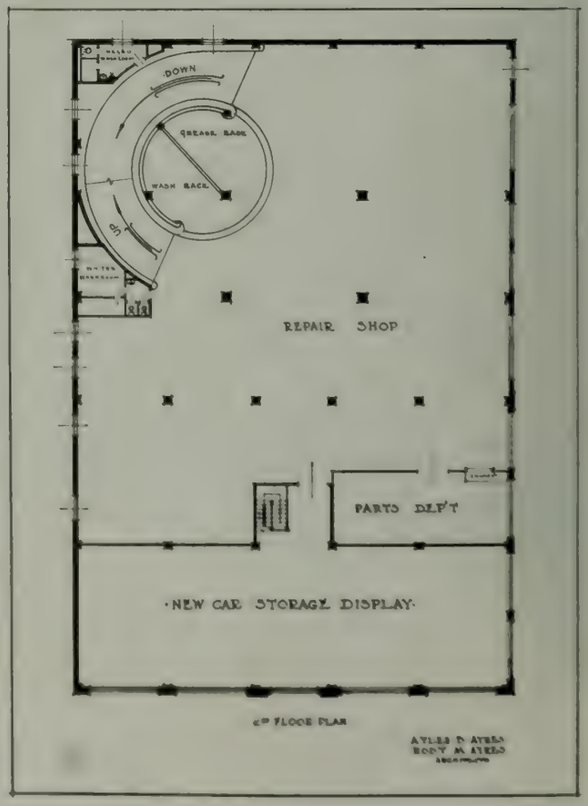




Photo. Pattison

PACKARD MOTOR CAR COMPANY BUILDING, SAN ANTONIO, TEXAS

ATLEE B. AYRES AND ROBERT M. AYRES, ARCHITECTS

NAIL STUDDED DOORS

from North Italy

MEASURED, DRAWN AND PHOTOGRAPHED BY MYRON BEMENT SMITH

Fig. (2).
Double doors hung in a pointed arched opening 5 feet wide by 10 feet high. The drawing shows the lower right corner of the opening. The doors date from about 1350 A.D., but have been fully restored

Figs. (1) and (3).
Double doors hung in a round arched opening 8 feet 5 inches wide and 16 feet high. The detail photograph and drawing both show a part of the right door with its hinge stile. The doors are oak and were probably made about 1400 A.D.

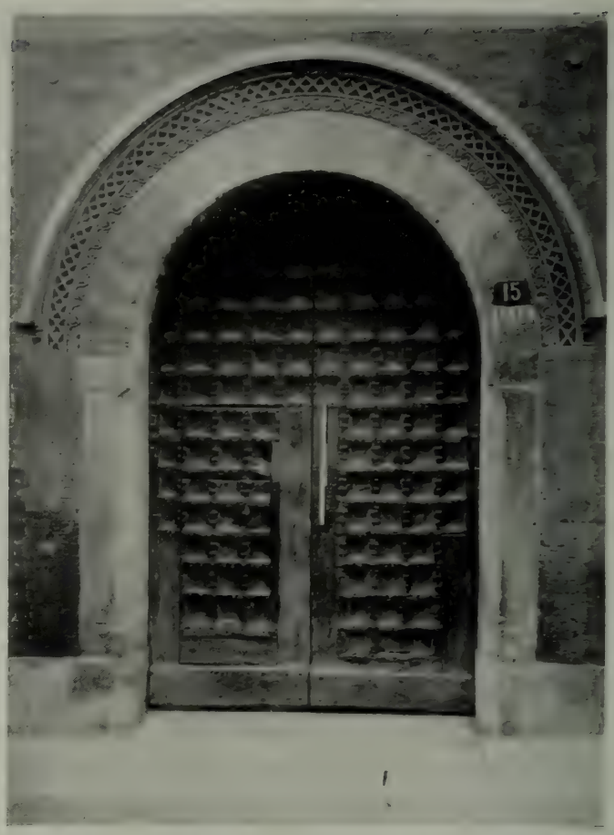


FIG. (1). DOORWAY, 15 VIA MAZZINI, PAVIA



FIG. (2). SIDE DOORWAY, S. PIETRO MARTIRE, VERONA

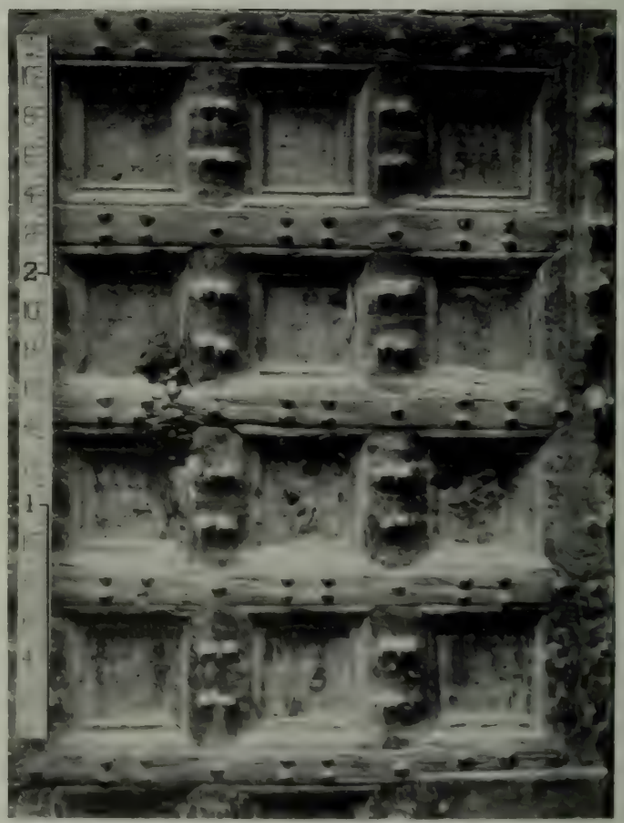
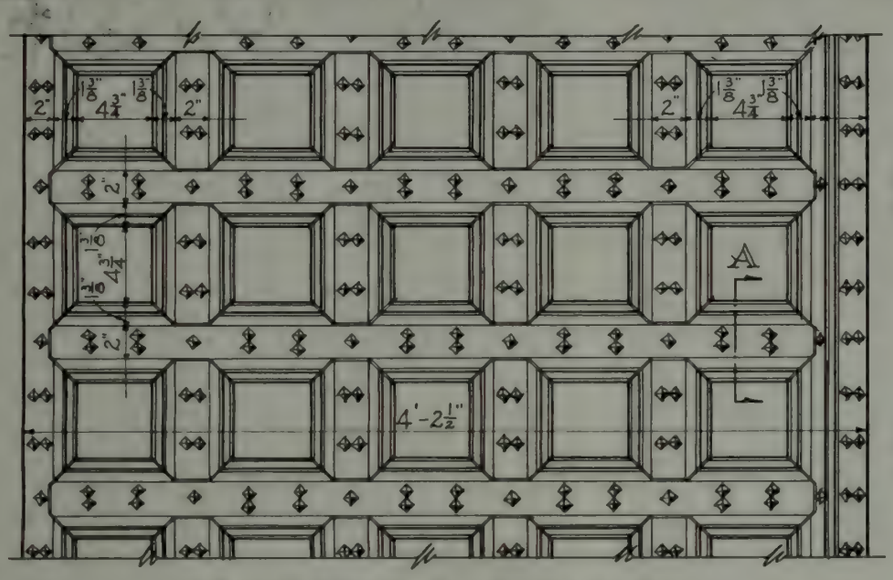


FIG. (3). DETAIL OF DOOR, 15 VIA MAZZINI, PAVIA





15 VIA MAZZINI, PAVIA

ONE INCH SCALE

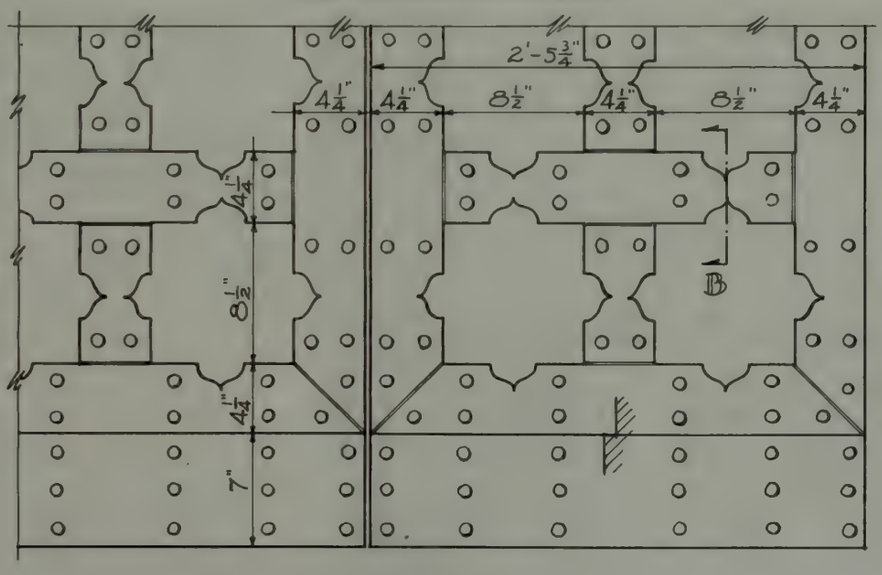
ONE FOOT



SIDE DOOR, S. PIETRO MARTIRE, VERONA

ONE INCH SCALE

ONE FOOT



NAIL STUDDED DOORS

FROM NORTH ITALY

SERIES 1 — PLATE 1

MEASURED, DRAWN AND PHOTOGRAPHED BY
MYRON BEMENT SMITH

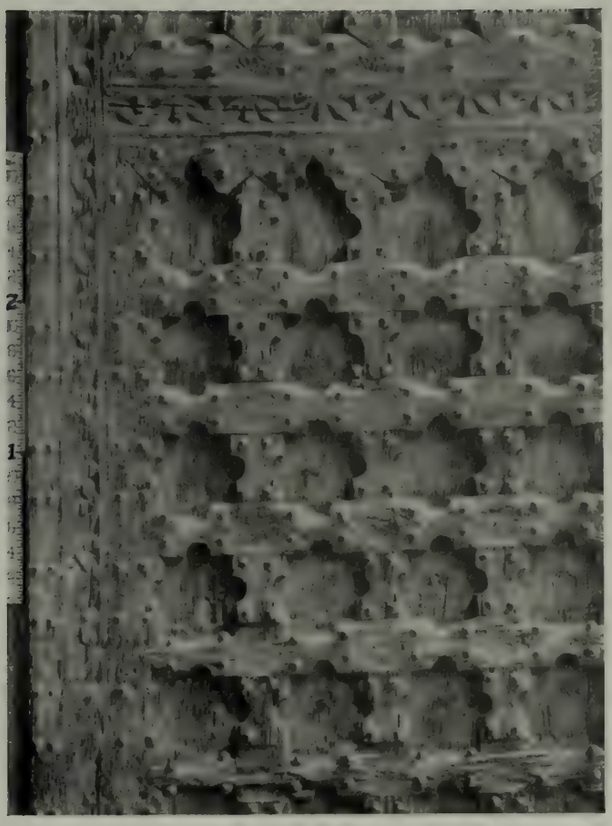


FIG. (4). DETAIL OF DOOR, S. ANASTASIA, VERONA

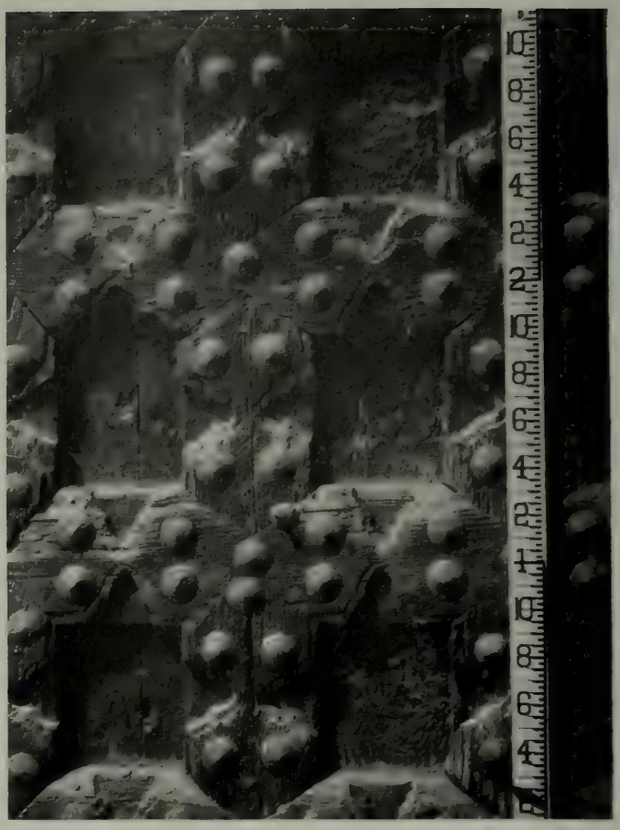


FIG. (5). DETAIL OF DOOR, 4 VIA ARCHE SCALIGERE, VERONA

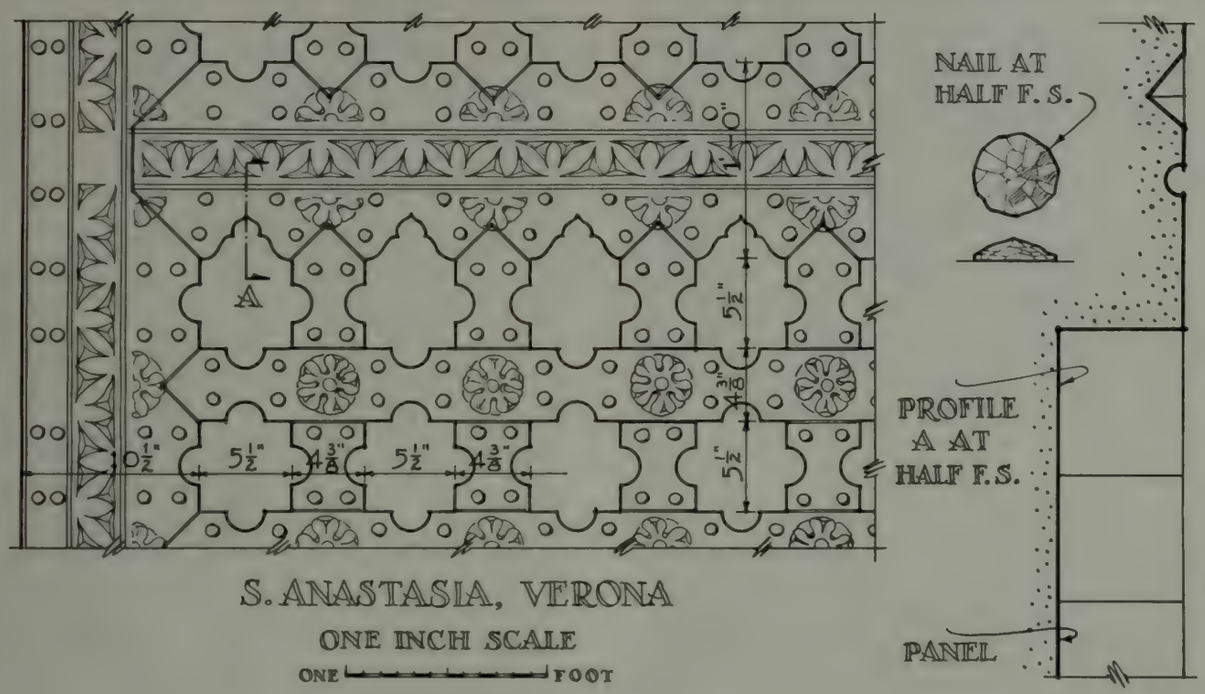
Round arched opening 11 feet 3 inches wide and 13 feet 6 inches high. Drawing shows a part of the right door with the stile at edge and the wide rail at the spring line. The material is oak. Doors now dismantled and hang in courtyard. Date from 14th century. Double doors



FIG. (6). DOORWAY, S. ANASTASIA, VERONA

FIGS. (4) and (6). S. ANASTASIA, VERONA

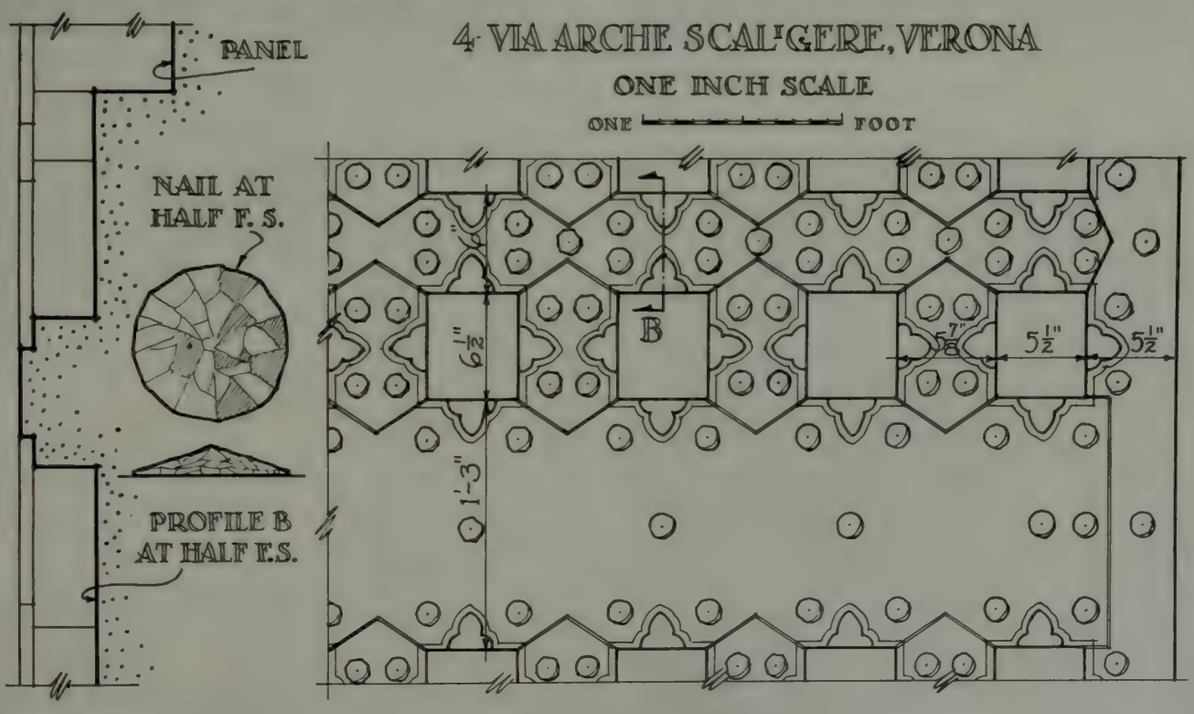
Square headed double openings, each 7 feet 7 inches wide and 16 feet 6 inches high. The detail photograph and drawing both show the middle section of the right door, with the dividing rail. The wood is oak, chip carved as shown. Dates from 1300, A.D.



S. ANASTASIA, VERONA

ONE INCH SCALE

ONE FOOT



4 VIA ARCHE SCALIGERE, VERONA

ONE INCH SCALE

ONE FOOT

NAIL STUDDED DOORS

FROM NORTH ITALY

SERIES 1 — PLATE 2

MEASURED, DRAWN AND PHOTOGRAPHED BY
MYRON BEMENT SMITH



FIG. (7). DETAIL OF DOOR, 1 VIA FILODRAMMATICI, MILANO



FIG. (8). DOORWAY, 1 VIA FILODRAMMATICI, MILANO

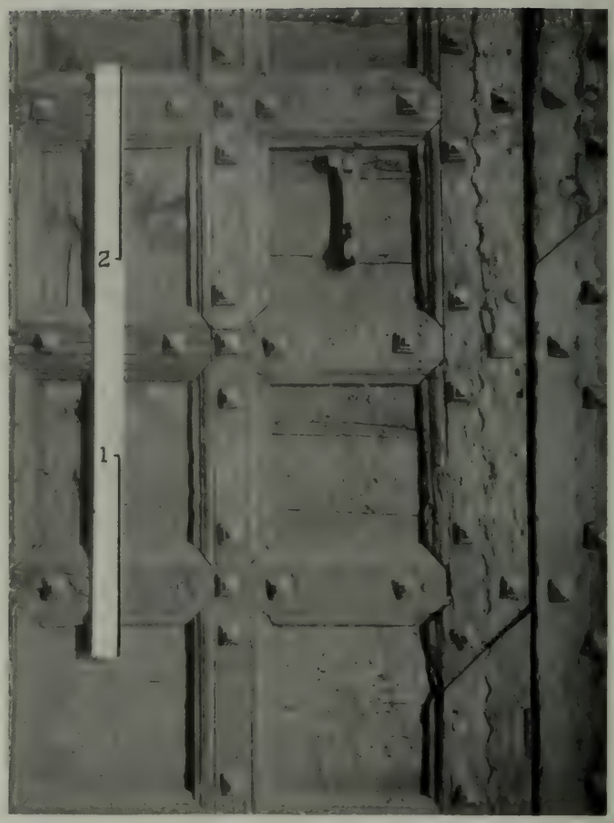
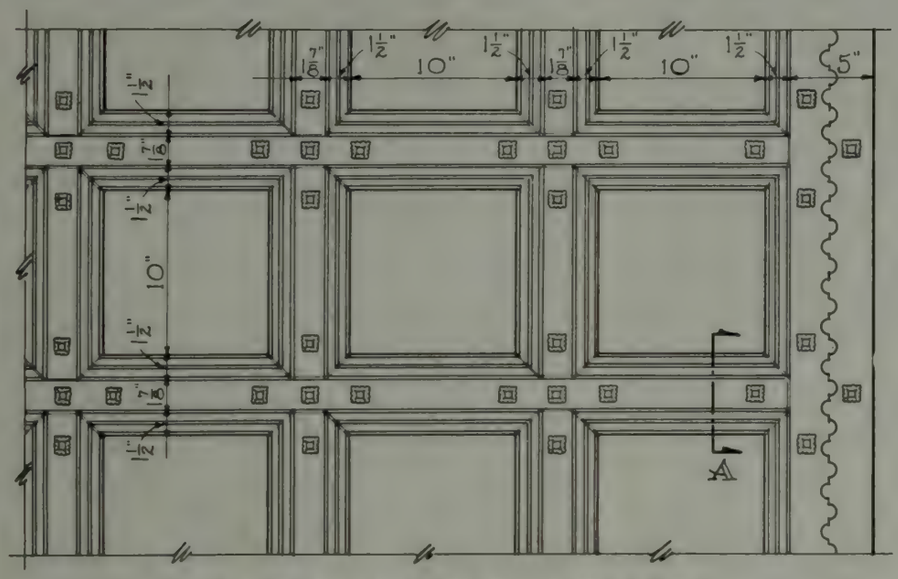


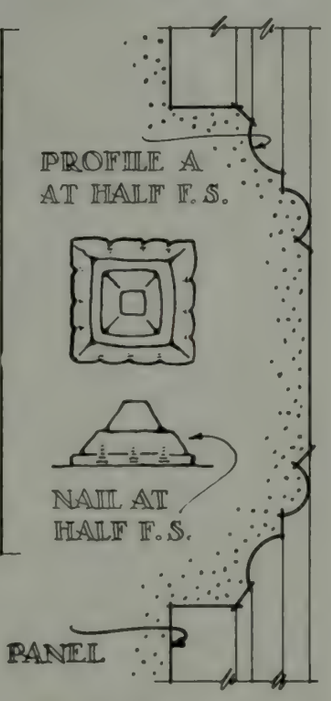
FIG. (9). DETAIL OF DOOR, BANCA MEDICEO, MILANO

Round arched opening 9 feet 9 inches wide. The detail drawing and the photograph both show the panels and meeting stile of the left door. Built 1457–1470, A.D. by Michelozzo Michelozzi for Pigello Portinari's palace. Now preserved in Museo Sforzesco. Double doors

FIG. (7) and (8). 1, VIA FILODRAMMATICI, MILANO

Pointed arched opening 9 feet 10 inches wide. The detail photograph shows the meeting stiles while the drawing is of the right door panels and the meeting stile. The doors are of pine. They date from about 1490 A.D.

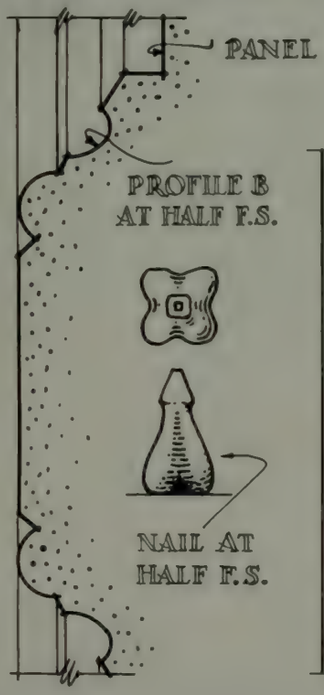




BANCA MEDICEO, MILANO

ONE INCH SCALE

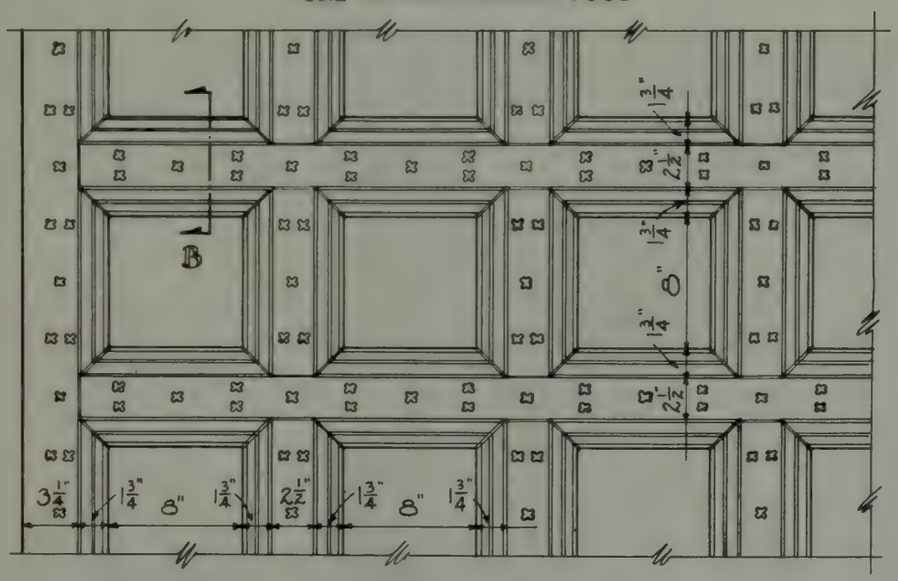
ONE FOOT



1 VIA FILODRAMMATICI, MILANO

ONE INCH SCALE

ONE FOOT



NAIL STUDDED DOORS

SERIES 1 — FROM NORTH ITALY — PLATE 3

MEASURED, DRAWN AND PHOTOGRAPHED BY
MYRON BEMENT SMITH

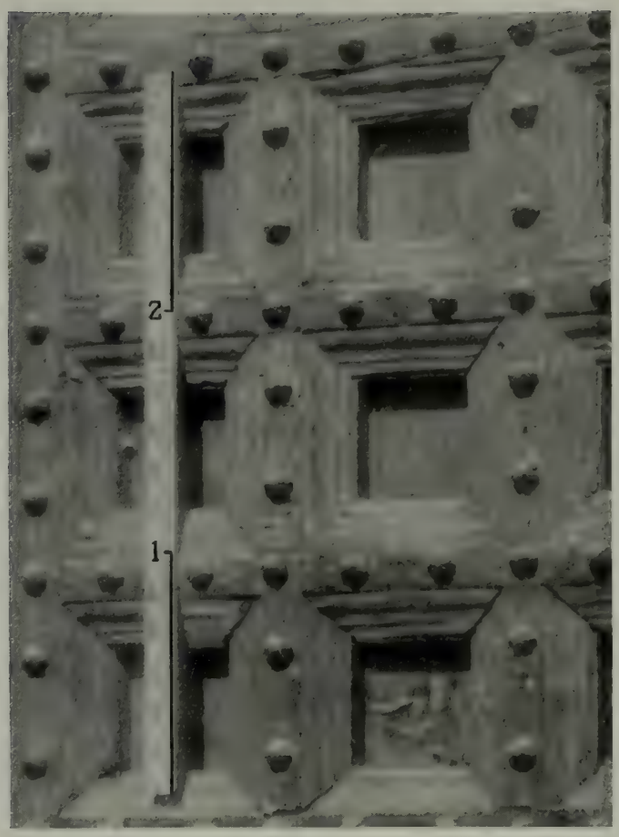


FIG. (10). DETAIL OF DOOR, THE CATHEDRAL, LODI



FIG. (11). DETAIL OF FRONT DOOR, S. PIETRO MARTIRE, VERONA

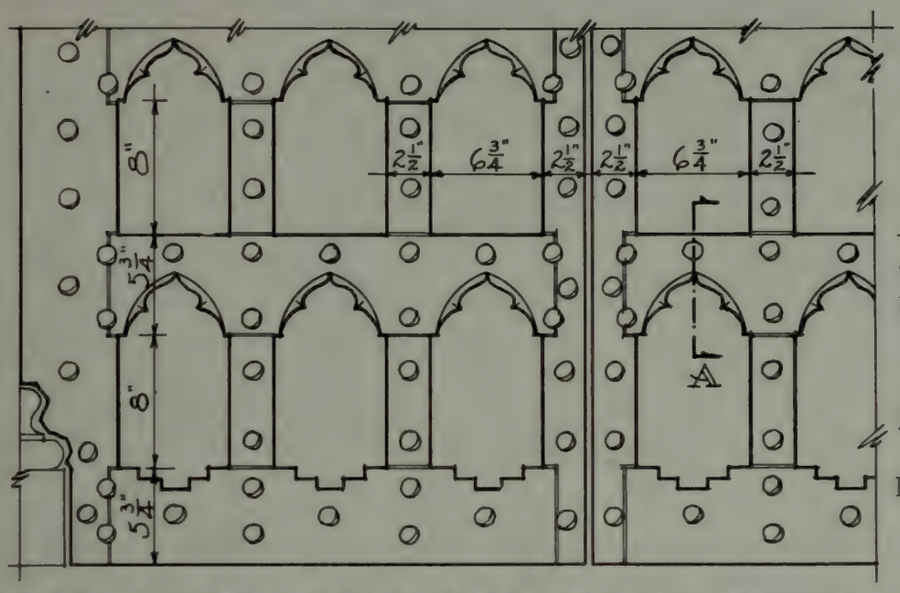
Square headed opening 6 feet 2 inches wide and 8 feet 4 inches high. Drawing shows part of the left door at lower outer corner, photo is of the same part at a higher level. The left door is three panels wide, the right one is four. Material is oak. Doors date from about 1350 A.D., with slight and noticeable restoration

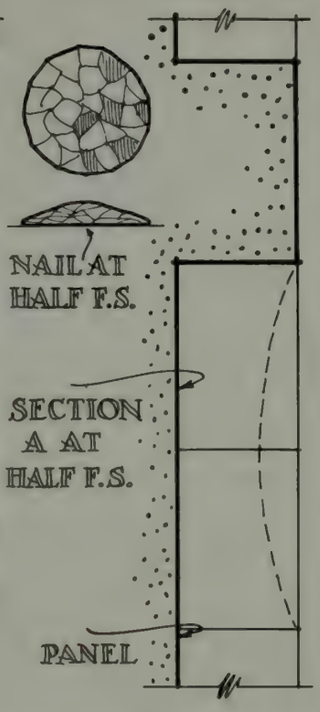


FIG. (12). DOORWAY, THE CATHEDRAL, LODI

FIGS. (10) and (12). THE CATHEDRAL, LODI

Double doors hung in a rectangular opening 9 feet 8 inches wide and 18 feet high. Both drawing and detail photograph show part of the right door with hinge stile. The rosette rail heads are ornamented with punchmarks. The actual doors date from about 1508, A.D. and are of oak

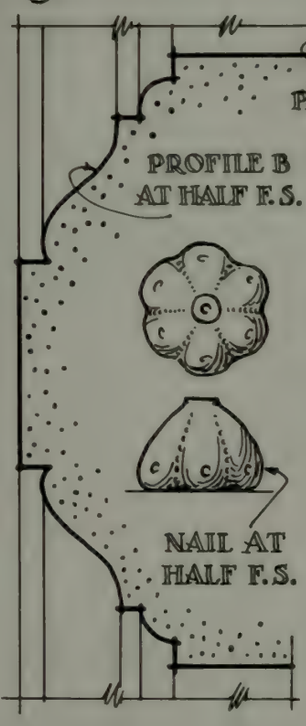




FRONT DOOR, S. PIETRO MARTIRE, VERONA

ONE INCH SCALE

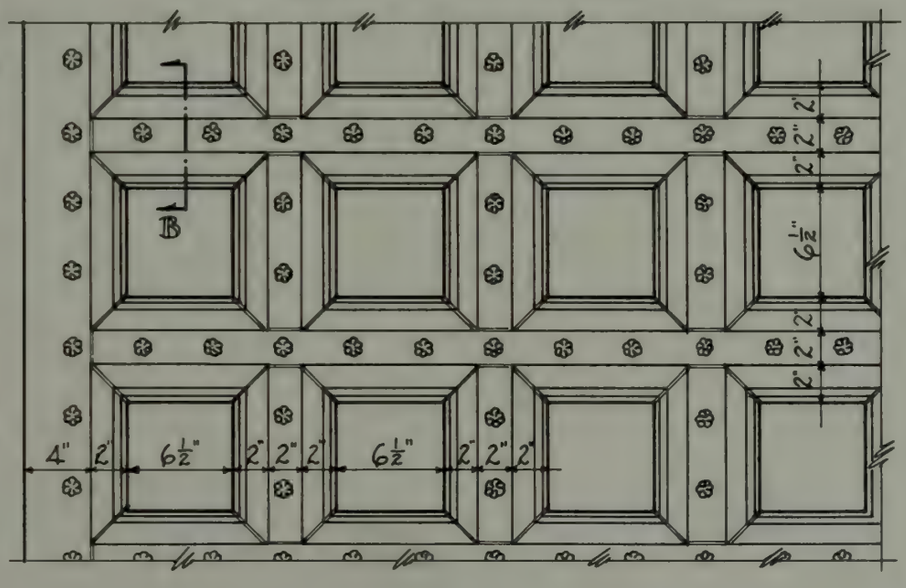
ONE FOOT



THE CATHEDRAL, LODI

ONE INCH SCALE

ONE FOOT



NAIL STUDDED DOORS

SERIES 1 — FROM NORTH ITALY — PLATE 4

MEASURED, DRAWN AND PHOTOGRAPHED BY
MYRON BEMENT SMITH

HOW BUSINESS FOR ARCHITECTS MAY BE STIMULATED

The abnormally high rate of vacancies in new buildings in some localities appears to be due not to a lack of desire for a decent home or an oversupply of dwelling space but to an oversupply of certain classes of space; in most cities this is of the more expensive type, in others, a surplus of typical middle class houses or apartments held at a rent or sale price too high for the average family.* In some few cases the vacant dwelling space is within reach of the rent-paying ability of the average man but the buildings are generally of inferior design and construction and in locations lacking in public utilities. In some cities there is an oversupply of one-room apartments, which, while they may be within reach of the average man, are certainly not suitable for the average family, which may get more space for the same rent in older buildings. It can safely be stated that practically no city or town has an oversupply of new four-room modern houses or apartments which are within the rent-paying ability of the average family.

Since an analysis of wages, budgets, and building costs, shows that it is practically impossible for the average man to buy, build, or rent, a new four-room house or apartment, *the building industry must find a way of cutting costs if it desires to create new markets*.

Leonard P. Reaume, President of the National Association of Real Estate Boards believes that costs can be cut through the development of (1) more equitable taxation, (2) a reduction of financing costs for homes, (3) a more economic use of the land, and (4) some method of economic standardization of building processes, *so that homes for people of average means* can be constructed *at costs substantially lower* than are at present possible and that these homes at the same time can offer increased convenience and be developed without monotony of design.*

Financing plans, similar to those used in the automobile business, have been developed by several of the larger companies dealing in building materials. This "time-payment selling" will doubtless stimulate the sale of their own materials and expand the general market for new residential buildings, but only to a limited degree.

Economic Use of Land

In his communication to the National Building Survey Conference recently held in Chicago to consider the present slump in the building industry, Thomas S. Holden, Vice-President of the F. W. Dodge Corporation, in charge of building statistics, suggested that a solution might be found if architects were given a more active part in planning and supervising community layout. "In the past," he says, "unregulated private initiative has resulted in economic waste with adverse reaction on all business. The trend today in large commercial building projects and the highest grade of residential developments is toward a close cooperation of architects, contractors, real estate experts and owners in *advance planning*. Similar cooperation is lacking in most speculative residential work. Could not the American Institute of Architects, the National Association of Real Estate Boards, and the U. S. Chamber of Commerce, cooperate in calling series of local conferences of architects and realtors under the leader-

* "During the twelve months ending March 31, 1930, residential building contracts in the 37 eastern states have amounted to $1,700,000,000 compared with an annual average of $2,700,000,000 in the years 1925 through 1928. The slump has been mainly in apartments and housing development projects." This statement is made by Thomas S. Holden, Vice-President of the F. W. Dodge Corporation who goes on to say: "It is my belief that this extensive residential slump must have gone very far toward deflating whatever oversupply of residential building existed a year ago."

* *New York Times*, Sunday, April 13, 1930.

ship of local chambers of commerce to investigate the problem of unsold houses and vacant apartments?

"*I believe these groups will find that architect-planned and—supervised residential developments sell better than private plan operations.*

"The local conference should also consider the formation of a permanent organization of architects and realtors to conduct advanced research into housing needs, advance planning of community development, and the promotion of better standards of housing construction. Let us not forget that construction activity is the first step to increased employment and prosperity."

Such a procedure is of undoubted value, and when combined with low cost financing should increase the market for new residential buildings; but it can not reach the average man until construction costs are also cut.

Standardization of Building Processes

In speaking of this side of the problem, Mr. Reaume says: "There is no good reason why, if the problem is studied, we cannot develop a new technique in home building. More and more portions of buildings can be fabricated in factories so that a finished dwelling could be assembled in a few days instead of a few months."

Mr. Reaume expressed the hope that all the industries in the building process would some day see fit to establish a research bureau whose purpose would be to study technical ways and means for reducing the cost of home building.*

On the problem of reducing the cost of home building, Herbert Hoover has said, "the real solution probably lies in some *radical departure* in house construction and economics, as it does not appear to us that we are likely to have such relative readjustments as will correct this situation."†

It hardly seems necessary to add to the above statements. Housing costs can be materially lowered and the building market expanded far above its average for the last few years, provided the building industry as a whole ceases being, as Col. W. A. Starrett has called it, "the most disorganized major activity known to modern business, agriculture perhaps excepted,"‡ and aligns itself with modern industrial practice.

R. L. Davison.

* *New York Times*, Sunday, April 13, 1930.

† For discussion of this problem see the article on New Construction Methods, Architectural Record of October, 1929; articles in the March, 1930, issue of the Architectural Record.

‡ "Skyscrapers and the Men Who Build Them." Charles Scribners Sons, New York.

TWO EXPERIMENTS IN ARCHITECTURAL EDUCATION

The transition from the college drafting room to the office of an architect by the graduate in architecture is usually without guidance or plan for future development. What the graduate seeks is a job. What the office usually wants is a draftsman with experience; and usually there is no interest in his degrees, his specialized training, or his paraphernalia of honor awards. When placed as a draftsman, he survives the first week or month by his ability to draw, trace, letter, and construct details. Offices generally do not attempt in any way to supplement the college preparation received by the young draftsman. As a consequence of the diverse nature of architectural training in schools and the application of the training in the office, the young draftsman frequently finds himself unable to render useful service, and he is incapable of systematically advancing himself toward his future.

Mr. R. H. Shreve of the office of Shreve, Lamb and Harmon, recently pointed out:

There are many men to whom the step from technical preparation to actual business practice presents problems which they are not equipped to handle. It is most desirable that in this transfer there should be merely a modification of the surroundings without radical variation in the method of thought, the nature of the study, or the ambitious interest in the task. Instead, there is too often a hampering sense of a complete altering of direction and activity, with a loss of measure or progress and a failure of real accomplishment.

Experiments by two schools where architecture is taught have recently been tried. One graduate from the College of Architecture, Cornell University, is employed each year by the office of Shreve, Lamb and Harmon. Upon the student's completion of his course and his nomination by the college faculty, the student places himself under the direction of the office and accepts its advice as to the manner of his use of time. He is asked to conform to the established office usage.

For one year he is paid a salary sufficient to enable him to live decently and comfortably in or near the city of New York. He is encouraged to study the office work as he did his student work and to perfect himself as far as possible in the development of himself along the line of that aspect of his work in the College of Architecture considered to be best calculated to advance his special ability, aptitude, or interest, by supplementing the preparation he has already had as a student at Cornell University.

At the termination of one year of work with this office the student is free to make plans to work elsewhere as he wishes.

The choice of students is made without limitation from the various courses of the college (design, construction, or executive training).

At the present time, there are in the office of Shreve, Lamb and Harmon, three men who came there under this arrangement.

The University of Illinois provides graduate study in the field, at Lake Forest, Ill., to selected graduates in architecture and landscape architecture. It is considered that the architect as master-mind must call upon members of other professions to aid with any project. There is a clear necessity for collaboration between architect and city planner or landscape architect. The following is a quotation from a statement on the experiment:

Collaborative problems shall be undertaken by teams of one architect and one landscape architect, to be chosen by lot and in rotation. The problems shall be worked out without criticism. The use of reference material is permitted. The solutions must be done in collaboration, but each student shall make his own drawings.

On days when the weather is not suitable for outdoor study, a sketch problem may be given for all students, the subject to be in the field of architectural or landscape design or in any of the allied arts. The execution of these problems shall be individual.

Field studies shall consist of the observation of examples, and preparation of records in the shape of freehand sketches, measured plans and details, water colors, or any other drawing or notation suitable for presenting the subject. Each subject shall be, as far as possible, left to the students with the guidance of the Committee on Education and the Director.

At the completion of the summer school, a jury selected by the American Institute of Architects, the American Society of Landscape Architects, and a layman appointed by the trustees, judges the work of the students and selects one architect and one landscape architect to enjoy a year of study and travel abroad, the award being known as the Edward L. Ryerson Travelling Fellowship in Landscape Architecture. These two students travel and study together continuously, carrying out the idea of the foundation of collaboration between the two arts.

If the correct process for the making of an architect is by study at a recognized architectural school supplemented by practice and business experience with reputable architects, then the question arises, "Why should there not be a closer cooperation between schools and offices?" The experiments at the University of Illinois and at Cornell University suggest possibilities for attaining such cooperation.

A. Lawrence Kocher.



SHALL THE "AUTOMOBILE GOD" OF DETROIT BE HELD IN CHECK BY THE "SKYSCRAPER GOD" OF NEW YORK?

TRAFFIC AND BUILDING ART

New York City and Cleveland Contrasted

BY HENRY-RUSSELL HITCHCOCK, JR.

Between the widely accepted truism that "New York is not America" and the patriotic statement, also widely accepted, that in the skyscraper America has developed a new, magnificent, and national form of architecture, there is a conflict of ideas that may throw some light on our architectural future.

Although much of the early history of the skyscraper derives from Chicago, this building type owes its mass development and its present essential form to the peculiar situation of New York. And while the skyscraper has spread to other cities—especially Chicago and San Francisco, which may perhaps on account of their metropolitan and cosmopolitan character be considered as included in the "New York" of the truism — in most cities both East and West it is a monstrosity, called into being for its publicity value and as an imitation of New York, but not as a necessary autochthonous development. So this very original and at times amazingly fine architectural development—to which even the supposedly imitative *Hochhaeuser* of Germany offer no real parallel—is American only in so far as "New York is America." Is all America to be New York? Or will it be something else?

We are forced to assume that transportation within cities (for airplanes with the exception of helicopters obviously affect only inter-city transportation) will remain indefinitely much as it appears to the layman today. And for the future of city architecture the question of traffic is very important: indeed the two are interwoven in an almost insoluble circular puzzle of cause and effect. Far from pretending to cut that circle and to build on primary data a utopian scheme, I here wish merely to indicate what will probably be the continuation of today's problem if it be intelligently controlled. For it seems more practical to take what exists and see what can be made of

it rather than to assume what has never been possible in the past, that a wholly new and theoretically perfect start may be expected in the future. Indeed it might well be held that any planning for the future must first accept and not deny the present.

•

In the New York of today, a city with an absolutely rigid plan, the extreme congestion within limited areas has made it virtually impossible to consider the automobile as a practical means of individual transportation; even the taxicab is becoming increasingly useless despite its lowering fare. A certain amount of automobile traffic across town is still practical but as the areas fill up that were left behind in the early advance of skyscrapers and high apartments, the high pressure on the present congested areas is not only rapidly intensified but also spread. As a result new means of cross-town rapid transit are already needed. In the largest and richest city in the modern world, over large areas travel by foot has again become the quickest means of getting about. Moreover, there is no probability of a change. In New York the future holds but the promise of a further spread of the superpopulated zones, with perhaps the alleviation of some regional clarification arranging certain interdependent zones within walking distance of one another, and developing a more complete spiderweb subway system for more distant travel.

But skyscrapers, it is generally accepted, exist fully as architecture only when they stand as single towers or may be seen from a certain distance. There is no architecture in three dimensions for a man who stands in a street that is completely lined with very tall buildings, however impressive in themselves such canyons may be. Except along parks, of which New York has disgracefully few, or from strategically placed upper story windows, there is no chance to see the skyscraper as three-dimensional architecture. The much vaunted skyline is seen with too much difficulty and from too great a distance to tell as more than a splendid silhouette: as an architectural *Stadtbild* it quite lacks plasticity. The casual and picturesque views from street corners depend far more on the position of the beholder than on the building seen. The stunning city pictures in the book *America*, compiled by Erich Mendelsohn, depend almost entirely on the skill of the photographers whose views he used; for the buildings in themselves were usually exceedingly poor. The great sin of the Paramount Building is its complete visibility: that is, its complete failure to take advantage of an unusually advantageous position; well hidden it might have provided occasional effective partial views. Leaving out of account the artist in the spectator, who, as the paintings of Edward Hopper show, can accomplish beautiful effects with the most unpromising buildings, the ordinary building of New York is thus reduced to the lining of streets at the level from which they are ordinarily seen. The art of the shop-front consequently becomes what it has by some intelligent designers long been felt to be, something quite separate, and detailed as design, from the masses about whose base it skirts. But that is the only building art which can expect much practice in the immediate future in New York. Even a fine building such as the Shelton, originally designed as a separate monument, has already become hedged in; and no doubt within a very short time even the aloof splendor of the Telephone Building will be spoiled. Except from certain distant points, the competing Transportation Building has been all but the ruin of the Woolworth Building.

Only monuments which can retain the supreme and peculiarly New York luxury of being low, such as the Morgan offices, the Public Library, the Grand Central Station (which is already finding it too expensive), or churches, can hope by means of an emphasis the reverse of that used in the past, to tell as independent works of architecture. But the architectural problem of making the most of such opportunities has scarcely ever been thought of. All the buildings of this type have been designed as if they were located like the Metropolitan Museum in a park, or surrounded by buildings of smaller scale as in the past. The emphasis of contrast has only been felt by the inversion of the traditional relation.

So at the very time that a transportational millenium is at hand, when, owing to high family wages, to low original prices, and to installment buying, a large proportion of all employed families might easily have an automobile of their own, this former convenience becomes for the New Yorker as useless, although admittedly as decorative an extravagance, as jewelry. It is sad to have to think that the art of window dressing, and the art of the effective use of occasional luxurious voids between the skyscraper walls, may encompass the future of megalopolitan architecture. Fortunately outside



FIFTH AVENUE

"In the largest and richest city in the modern world, over large areas travel by foot has again become the quickest means of getting about." In New York the future may bring the formation of certain interdependent zones within walking distance of one another, with a more complete spider-web subway for more distant travel

New York the picture still appears less gloomy both as regards the automobile and as regards architecture.

In Cleveland the business district is small, rather solidly and evenly built up, and quite sharply circumscribed. Within it the buildings are in the main what would have been called skyscrapers a generation ago, although today they appear merely as very ordinary large buildings of the size and type found most practical for offices and stores. Among these are several real skyscrapers. One is very fine in the current New York formula—the Telephone Building; another, in the New York formula of before the war, the Union Station Tower, is said to be the second tallest in the world, but does not seem to rank so high in design. Both of these monuments are obvious bids for publicity.

Immediately beyond the last high buildings on the two sides in which the city is expanding, a sharp line, presumably controlled by zoning, separates the downtown district from a region of garages. There is even open parking spaces within easy walking distance of downtown. On the other two sides of the center there lie, respectively, the railroad-bordered lake and the factory district. Beyond the region of garages and parking space begins what in the East could be considered the suburbs; but here it is all Cleveland for miles and miles; and in all this surrounding area—by what realtors' feats, by what zoning miracles this was established I cannot say—there exist only occasional and widely separated



Photo. Galloway

FIFTH AVENUE

A wide street has value only when the main business and social institutions to which people flock at regular hours are sufficiently separated so that the different crowds do not become involved with one another, and the street serves one main stream at a time. The Cleveland city plan suggests a solution: The business center is tightly self-contained, immediately outside is an area of low land values permitting garages; recreational centers are spread out at some distance from one another, and reached by arterial traffic



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FORTY YEARS AGO: THE SAME SECTION

The city has grown; the traffic has changed; but the streets are nearly the same.

Nevertheless the example of Cleveland suggests that zoning may do much to make conditions tolerable. With city zoning must go the study of the *group planning of buildings*. "After our inebriation over the skyscraper, this is a sobering thought"

tall buildings. Across this suburban city, automobile through-traffic can speed along the cascade-lighted* Carnegie Road while local automobile traffic is served by the American gridiron which follows out on either side of Euclid Avenue. Yet in this suburban city area are found the hotels, restaurants, clubs, dance halls, libraries, schools, museums, and more and more theatres and small stores—all the attendant paraphernalia of the large city which serve not only this area but the whole city, and which have become so unapproachable in the traffic conditions of central New York City. Of course, New York has similar suburbs, but here the suburbs are the city. The prevailing low suburban buildings, with only isolated tall ones, make congestion impossible; and all of these institutions may be reached freely at any time either by automobile or by the Euclid Avenue street cars.

Further out, just before Wade Park, is a sort of uptown nucleus with buildings not very high or close together, chiefly resident hotels, churches, and theatres. Beyond the Park, still not more than half an hour's drive from the business district, begin the residential suburbs of all classes, from the palace-lined Lake Shore drive to the Van Sweringen developments with their pathetic detached villas alternately English and Colonial. These further and cheaper suburbs, although at some distance from the city center, are accessible in about three quarters of an hour by automobile or by a special rapid-transit line.

Thus despite its great expansion the city plan of Cleveland becomes in principle very much like that of European cities which have been perhaps more successful than those of Eastern America in their adaptation to the automobile. The separate social institutions to which the people of a large city crowd at regular hours, such as the theatres, restaurants, schools, and libraries, are kept sufficiently separated to make it possible to get to each without becoming involved in the crowd going to the others; and once arrived it is frequently even possible to park within the same block. And in the placing of residence districts it has been realized that it is not geographical but temporal proximity that counts, and even

*That is, the control lights are so timed that once past one green light the motorist, if he keeps a definite rate of speed, continues to meet only green lights.

that the ease and the predictability of the length of the trip from home to office are more important than its actual length either in distance or in time.

Now if business districts can be made as tightly self-contained as in Cleveland by zoning, and if immediately outside them low land values



Photo. Galloway

can permit the existence of garages and even of parking places; if recreational buildings can be spread out and placed at some distance from one another in the suburban city district through which arterial traffic is permitted to pass rapidly, there naturally follow certain very definite effects upon building in general, and specifically upon architecture. Obviously within the constricted business district the worst New York conditions will prevail. The buildings will be put up and pulled down in response to economic pressure almost as rapidly as the temporary office partitions which are changed to suit new tenants. At the bottom of the street canyons in which no one need spend more than five or ten minutes between office or store and garage or parking space, the shop-front linings will be nearly as evanescent and let us hope as lively as the sets of a stage. This is not an ideal solution, but it is a practical one, toward which, in New York particularly, we seem well on our way. It is too ever-changing a picture to cheer the heart of architectural utopists who have ever, and rightly, dreamed of permanence.

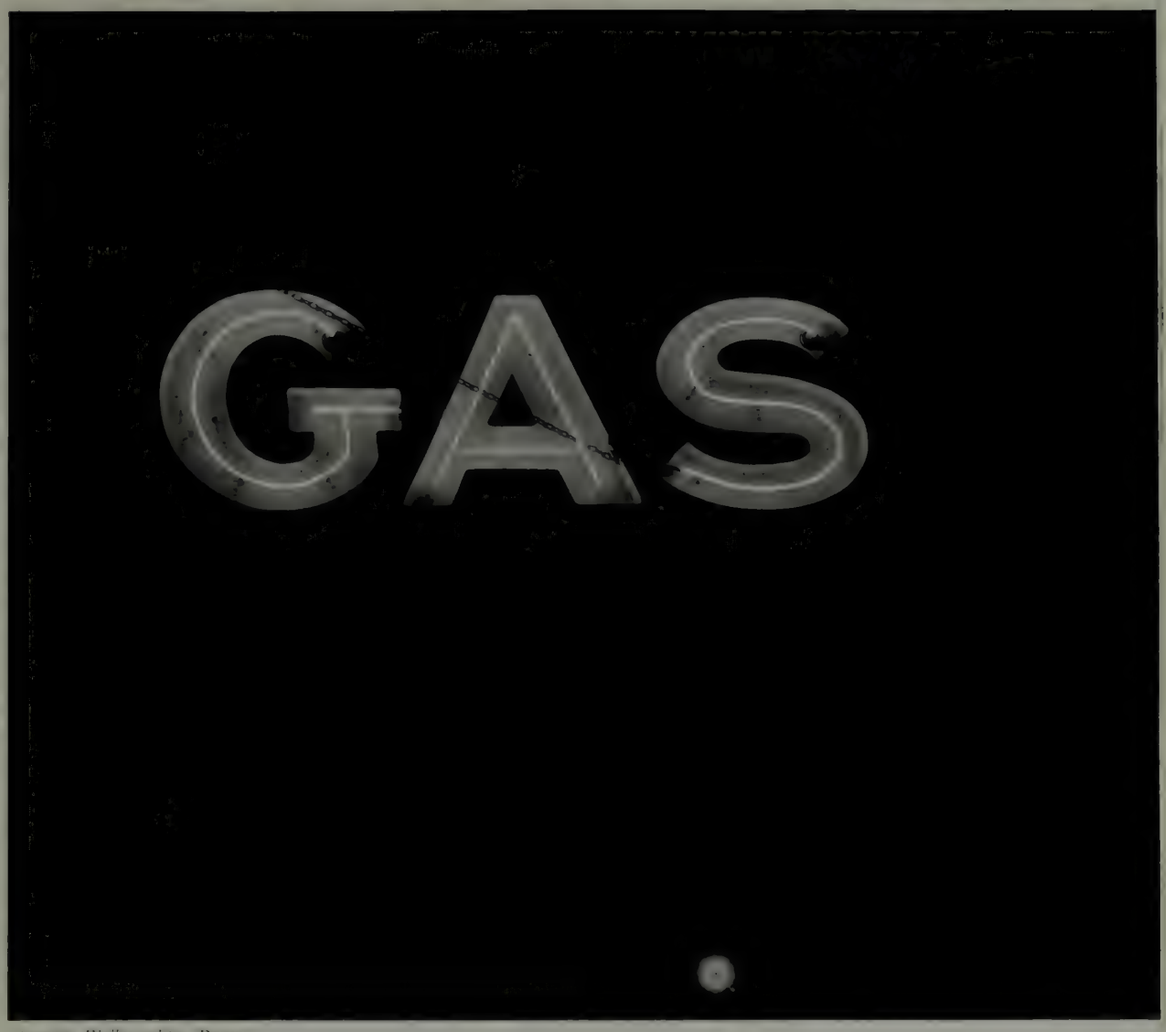
But in the suburban districts outside this central city it becomes possible to make buildings which shall be more than the evanescent linings of canyons, and which may tell by their masses at human scale either as separate works of architecture or as masses related intelligently to their neighbors in some larger scheme.

The apartment has provided one means of bringing order and large scale to many dwellings. It is desirable that further attempts be made in the direction of bringing similar order and large scale to small dwellings which lie side by side, since outside New York these seem destined to dominate. At present the lines of shallowly individual and "correct" villas with their silly variety and their lack of insulation too often monotonize both inexpensive suburbs such as Shaker Heights, and some expensive ones, such as Cleveland Heights.

The two fields in which a consideration of Cleveland leads one to hope for the future monuments of American architecture are just those in which the whole past of Western European architecture, even down through the Second Empire work of the Baron Haussman in Paris, has excelled, and in which contemporary European architecture has also shown both skill and success. These are the fields of city zoning and of group planning. After our inebriation over the skyscraper, this is a somewhat sobering thought, but we can hardly be willing as a whole nation to sacrifice the cult of the Auto-



mobile God of Detroit to the Engineering God of New York. Therefore, as opposed to the single-minded pursuit of the will-o'-the-wisp of the skyscraper the increasing study of modern European work by American architects seems more than justified.



Courtesy: Walker and Co., Detroit

THE ARCHITECTURAL RECORD: JUNE, 1930
TECHNICAL NEWS AND RESEARCH

THE GASOLINE FILLING AND SERVICE STATION

A STUDY BY K. LÖNBERG-HOLM

NEXT MONTH: Making Buildings Rain-tight; also, Theatre Auditorium Planning, Lighting, Acoustics, and Construction.



). Fairchild Aerial Surveys, Inc.



rtesy E. I. du Pont de Nemours Co



rtesy Standard Steel Works, Kansas City

Characteristic forms, easily read. (See text, page 564). Tanks and stations are links in one chain. Why not apply the principles of tank design to the station? Clear definition of function. Economy of form and material.



Photo. Underwood and Underwood

"Land traffic, air traffic, and water traffic, present individual fuelling problems"

THE GASOLINE FILLING AND SERVICE STATION

BY K. LÖNBERG-HOLM

Functions

The gasoline filling and service station serves two distinctly different functions:

1. *Distribution of fuel for traffic instruments, powered with gasoline engines.*
2. *Upkeep and repair of these instruments.*

Land traffic, water traffic and air traffic present individual fuelling problems. This study deals with stations for land traffic.

Determinants

The gasoline filling and service station is a commercial enterprise. The income-producing capacity of the station is determined by:

1. *The products sold.*
2. *Efficiency of operation.*
3. *Cost of construction, maintenance, and operation.*
4. *Relations to the driver who buys the fuel and the repair service.*
5. *Relations to the community of which the station is an integral part.*

Designing a station is a problem of organizing a structure to meet the following demands:

1. *Maximum appeal to the driver.*
2. *Maximum ease, certainty, and safety of operation.*
3. *Minimum cost of construction, maintenance, and operation.*
4. *Maximum plastic unity of the basic units.*
5. *Maximum organic relation to the community.*

Mr. Arthur Brace of the Tide Water Oil Company's Construction Engineering Department, Mr. Raymond Browe of the Standard Oil Company of New York's Construction Engineering Department, and Mr. Robert L. Zahour of the Westinghouse Lamp Company's Research Department, have been consulted in the preparation of this paper.



The often conflicting interests of commerce and community. A chaos of competitive advertising, and false conformity of buildings.

Existing stations reflect the often conflicting interests of commerce and community. Crude competitive advertising has violated community interests. Greek sheet-metal temples, Dutch windmills, Chinese pagodas, miniature French castles, and dreams of Spain and England, have been scattered generously along streets and highways. The latest trend in station design shows a reaction that apparently has checked the worst offenses. Some companies have adopted designs that are but slightly different from adjoining residential or ecclesiastical architecture. The mechanical equipment has been concealed for the benefit of forced *plastic uniformity*. The doubtful value of these structures is the purely negative quality that they don't offend. But they have lost their individual character. They have not been permitted to be what they are.

A community is a sum of conflicting interests organized to a unity. *The architectural merit, i.e., the plastic value of a community, depends upon the easily perceived differentiation between the basic functions. They should be easily read. The home, the school, the city hall, the factory and the filling station should be clearly recognized. The desired plastic unity is a final result of a clearly formulated program and rational use of material, form and color.*

Types

The stations can be divided into types according to ownership and operation, or according to the kinds of service they sell. Using the first differentiation there are the following main groups:

1. *Stations built and operated by oil companies.*

These stations are built to serve one manufacturer and therefore do not include sale of tires and tire-repair service.

2. *Stations built by oil companies and leased to operating companies or to individual operators.*

The leasing of stations to operators instead of running them with company personnel has been adopted by some oil companies. These companies have organized station-operating companies that in turn lease out the stations to individual operators. Each company maintains two or three company-operated stations to obtain retail price schedules. The advantages of this method are:

(a) decreased overhead.
(b) increased personal interest of the operator in the sale.
(c) More complete service for the driver by adding sale and repair of tires.

3. *Stations built by operating companies or by individual operators, and operated by them.*
4. *Stations built by building corporations, cooperative associations, or communities*, leased to operators or oil companies, or operated by the owner.

Arranging the stations according to the number of intended functions we get a number of overlapping groups, ranging from the isolated pump, attached to a way-side refreshment stand, to the "super-service" or

"one-stop station" planned for complete service: filling, greasing, lubricating, battery service, washing, repair and sale of tires and accessories. Among the elaborate stations are those combined with hotel or camping accommodations, stations connected with stores or bus terminals, and stations planned as centers for future community developments.

Location

The location of the station is governed by the class of trade desired—whether resident, transient, or both.

1. *Commercial considerations.*

The location should be governed by a survey of existing and expected traffic and the number of resident cars in the neighborhood. Among stations in residential districts the greater part of the sale is to resident trade. Wide, well paved and well travelled streets are preferable to narrow and unpaved ones. The side of the heaviest traffic is more productive of business. Intersecting streets usually furnish good sites. The location of traffic beacons must be taken into consideration. The entrance to the station should be at the corner where the heavier traffic is stopped by the signal. Inside lots are good in residential districts, but must contain ample area for approach and roomy drives. Corner lots have the advantage of being easily seen from a distance, are rapid in handling of business, and usually permit arranging the building and drives so that the pumps are accessible from either street. The grade is important. The pitch to the street must not be too great. Relation to competing stations and possibilities for future expansion of the station must be considered.

2. *Community considerations.*

The community plan should provide space for filling and service stations in connection with shopping centers, recreation centers, business centers, etc. Ample parking space should be provided. The customers should be able to leave their cars for filling and overhauling while they do their shopping.

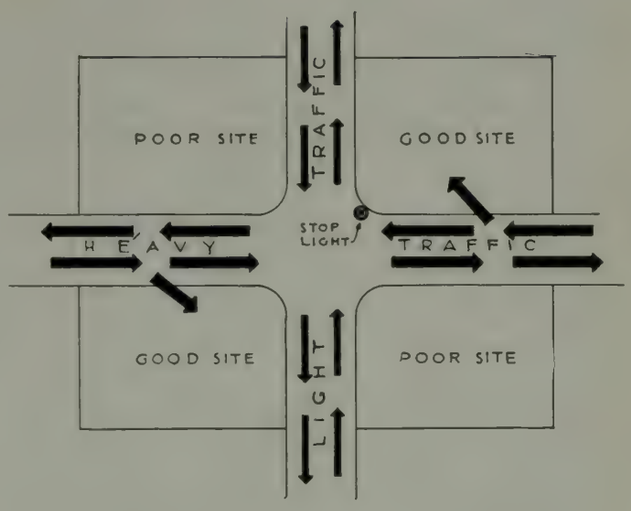
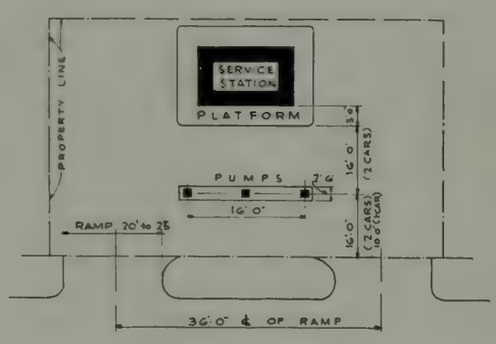


Diagram showing how the relative value of corner sites is determined by the traffic beacon. The station should be at the corner where the heavy traffic is stopped by the signal

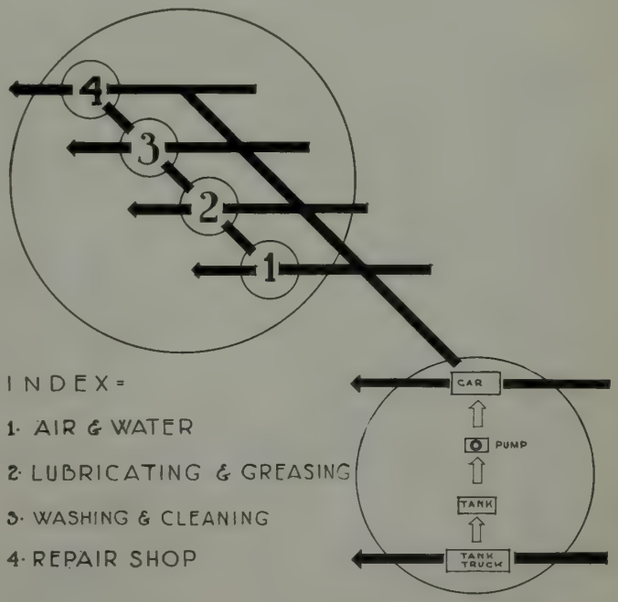


Layout showing minimum required dimensions

Layout

The layout of the station should insure separate handling of each operation. The basic units should be organized in the following sequence:

1. *Means of access and exit: ramps and driveways.*
2. *Means of sale of gas: tanks, pumps, and sales room.*
3. *Means of upkeep and repair: pits, lifts, repair shop, parking space, air towers, water stations.*
4. *Toilets, rest rooms, and storage.*
5. *Signs and exterior lighting.*



Operation Chart.

Filling and service operations should be clearly separated.

Ramps, Driveways and Yard

1. *Layout.*

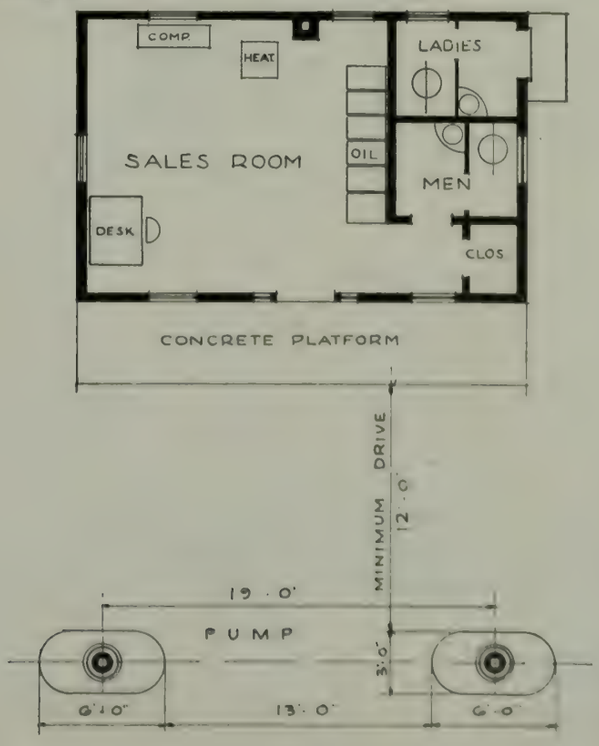
The ramps are the entrances to the station. They should easily absorb the moving traffic. Sharp turns should be avoided. The width should be not less than 20 feet (the width is usually restricted by local codes). The driveways should be laid out according to a traffic diagram that insures a minimum of interference by

MOTOR CAR DIMENSIONS, 1930

MAKE	*(L.)	*(W.B.)	*(F.)	*(R.)	*(W.)	*(H.)	*(C.)	*(T.D.)
Ford A	12′–11 ¼″	103 ½″	21 ¼″	30 ½″	5′–7″	6′–0 ¼″	12 ⅜″	34′–0″
Whippet 98A	13′–2 ⅜″	112 ½″	18 ¼″	27 ⅝″	5′–7 ½″	5′–10 ½″	12″	44′–0″
Chevrolet AC	13′–5″	106 ½″	24″	30 ½″	5′–6 ½″	5′–11 ⅝″	11 ½″	41′–2″
Erskine 52	13′–5 ½″	109″	22 ½″	30″	5′–5″	5′–8 $\frac{9}{16}$″	11″	36′–0″
Pontiac	13′–11″	110″	23″	34″	5′–10″	5′–10″	12 ¾″	39′–2″
Essex D	14′–0″	110 ½″	23″	34 ½″	5′–4	5′–10 ½″	12″	45′–2″
Plymouth	14′–1″	——	24″	35″	5′–7″	6′–1″	12 ½″	——
De Soto	14′–1″	——	24″	35″	5′–7″	6′–0″	12 ¾″	——
Oldsmobile	14′–1 ⅝″	113″	21 ⅝″	35″	5′–9″	5′–10″	12 ¼″	41′–6″
Roosevelt S	14′–3 ⅞″	112 ¾″	22 ¼″	36 ⅞″	5′–8 ¼″	5′–10 ¼″	11 ½″	35′–8″
Dodge Six	14′–4″	112″	25″	35″	5′–6 ½″	5′–11 ½″	12 ¼″	42′–0 ¼″
Marquette 30	14′–5 $\frac{3}{16}$″	113 ½″	22 ½″	37 $\frac{3}{16}$″	5′–9 ½″	5′–9 ⅜″	11 $\frac{5}{32}$″	38′–7″
Oakland 6-212	14′–7″	117″	23″	25″	5′–11 ¼″	5′–11″	12″	40′–0″
Marmon 68	14′–8 ¾″	114″	24 ½″	36 ¼″	5′–8 ¾″	5′–10 ¼″	11″	38′–0″
Studebaker FC	14′–9 ⅜″	115″	23 $\frac{3}{16}$″	39 $\frac{3}{16}$″	5′–9 ¼″	5′–9 $\frac{7}{16}$″	11 $\frac{3}{16}$″	39′–1″
Graham-Paige 612	14′–10″	112″	23″	36″	5′–8″	5′–10 ½″	12″	40′–6″
Dodge Senior	15′–2″	120″	25″	37″	5′–9 ⅛″	6′–0 ⅜″	11 ¾″	47′–4″
Chrysler 66	15′–2″	——	28″	36″	5′–9 ¼″	5′–11″	11 ½″	40′–0″
Marmon 78	15′–4″	120″	24 ⅝″	39 ⅜″	5′–8 ¼″	5′–10 ¼″	11″	42′–0″
Buick 40	15′–4 ⅛″	118″	24 ¾″	41 ⅜″	5′–10 ⅜″	5′–11 ¾″	10 ⅛″	39′–6″
Willys-Knight 66B	15′–5″	120″	23 ¼″	41 ¾″	5′–10″	6′–3 $\frac{3}{16}$″ ✓	9 ½″	41′–7″
Ruxton	15′–7 ½″	130″	23″	34 ½″	6′–0.″	5′–3″	10 ¾″	38′–0″
Viking	15′–8″	125″	24″	39″	5′–10″	6′–0″	12 ½″	47′–0″
Packard 626	15′–8 $\frac{13}{16}$″	127 ½″	24 $\frac{5}{16}$″	37″	5′–11 ⅞″	6′–0 ½″	9 $\frac{9}{16}$″	45′–2″
Hudson R	15′–9″	122″	28 ½″	38 ½″	6′–1″	5′–11	11 ½″	45′–9″
Chrysler 77	15′–9 ½″	——	28″	36″	5′–9 ¾″	6′–0″	12″	42′–0″
Auburn	15′–9 $\frac{9}{16}$″	130″	24 ¼″	35 $\frac{5}{16}$″	5′–10″	5′–10 ½″	9 ⅞″	40′–0″
Franklin 147	15′–10″	132″	26″	32″	5′–11″	6′–0″	11″	43′–0″
Cord L 29	16′–5″	137 ½″	20 ¼″	39 $\frac{3}{16}$″	6′–2″	5′–6″	13 ¼″	46′–1″
Lincoln	16′–7 ½″	136″	24″	39 ½″	5′–10″	6′–5″	14″	50′–5″
Pierce-Arrow 125	16′–8 $\frac{1}{16}$″	133″	26 ¼″	40 $\frac{13}{16}$″	5′–11 ⅜″	6′–0 $\frac{11}{16}$″	10″	45′–0″
Buick 60	16′–8 ⅜″	132″	25 ⅜″	43″	5′–11 ⅜″	6′–1 ½″	10 $\frac{3}{16}$″	45′–5″
Graham-Paige 837	16′–8 ½″	137″	27 ½″	36″	5′–10″	6′–2″	12″	47′–4″
LaSalle 340	16′–11″	134″	26″	43″	5′–11 $\frac{1}{16}$″	6′–1 $\frac{3}{16}$″	12″	49′–9″
Studebaker FE	17′–3 ⅞″	135″	27″	45 ⅞″	5′–9 ¼″	5′–11 ⅞″	11 ⅞″	49′–9″
Pierce-Arrow 126	17′–5 $\frac{1}{16}$″	143″	26 ¼″	40 $\frac{13}{16}$″	5′–11 ⅜″	6′–0 $\frac{11}{16}$″	10″	49′–0″
Packard 645	17′–6 $\frac{7}{16}$″	145 ½″	25 ⅝″	39 $\frac{5}{16}$″	5′–11 ⅞″	6′–0 ½″	9 $\frac{9}{16}$″	54′–8″
Cadillac 353	18′–8″	152″	27 $\frac{13}{16}$″	45 ¾″	6′–1″	6′–2 ¾″	12″	55′–8″

(*) NOTE: Information supplied by Automobile Manufacturers. Where makes are repeated, figures are for smallest and largest models. (L) length; (W.B.) wheel base; (F.) distance from center of front hub cap to front extremity; (R.) distance from center of rear hub cap to rear extremity; (W.) width; (H.) height; (C.) distance from ground to underside of running board; (T.D.) Turning Diameter (diameter of smallest walled-in circle in which the car will make a complete turn).

Courtesy Ramp Buildings Corp., N. Y.



Standard Layout for small filling station, Gilbert and Barker Manufacturing Co., Springfield, Mass.

cross-traffic. Traffic lines to pumps should be separated from traffic lines to the shop service. Parking space should be provided in connection with the service unit.

2. *Construction.*

Ramps, driveways, and yard, should be easily cleaned or re-dressed, and have a surface suitable for rubber tires. Concrete, asphalt, tarvia, and macadam, will serve the purpose. The Standard Oil Company of New York specifies:

Filling under drives and floors of buildings to be of good clean earth, stone, cinders, or gravel, well tamped and watered and placed in layers not over 12″ deep, each layer being thoroughly tamped and rolled. Any sod or soft spots in the subgrade are to be removed and replaced with suitable material. Cinder fill shall not be placed within six inches of any pipe or metal work.

Paving

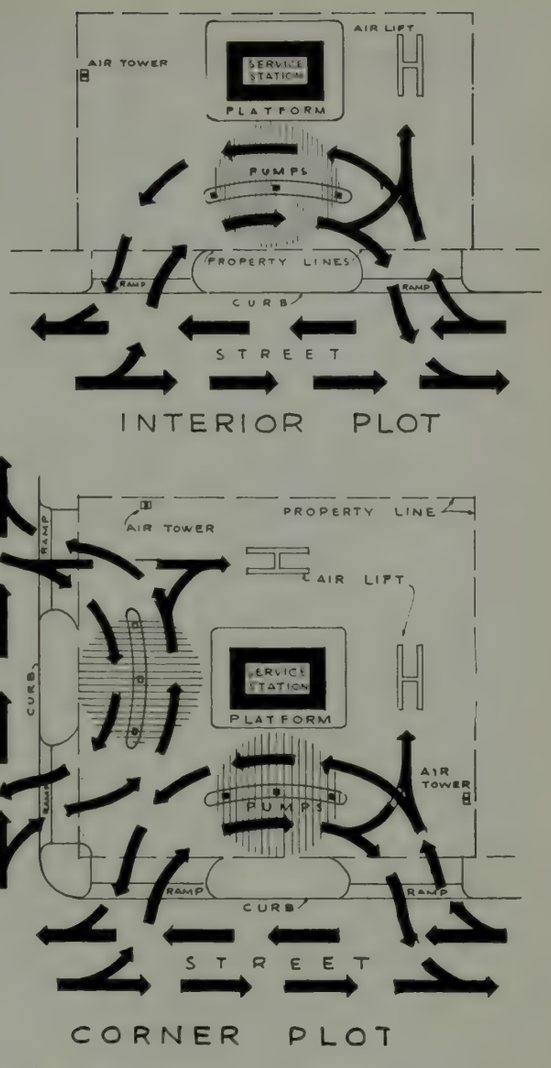
1. *Stone surfacing.*

Excavate or fill to a level eight inches below the finished paving grades with substantial earth shoulders at edges. Place a base course, six inches deep, of 2-inch to 3-inch trap rock, limestone, slag, or granite. Over this base course place an intermediate course two inches deep of the above material in ¾″ size. The finish course shall be screenings of the above material soaked with water. Each course shall be rolled with a power roller. The depth of the finished course shall be sufficient to bring the finished surfacing up to the required grades, without depressions in any portion.

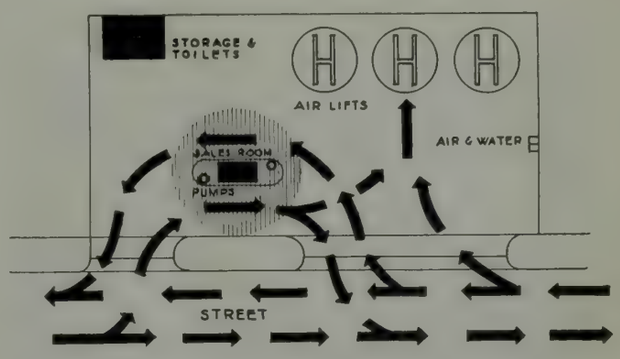
Note: In locations where stone is not readily obtainable and where cinder driveways are noted on the plot plan, the contractor may use cinders for the base course, with a 2-inch intermediate course of ¾-inch stone or slag. The filling and finish course shall be as above specified.

2. *Concrete paving.*

Excavate or fill to a level of 6 inches below the finished paving grades. Concrete paving shall be 6 inches thick of 1:2:4 Portland cement, clean sharp sand and trap rock or gravel to pass a 1½-inch ring. Paving shall have mesh reinforcing, placed 2 inches from top. Paving shall be divided into squares about 20 feet each way with ½-inch expansion joints filled with Socony asphalt. The stone aggregate shall be struck below the surface and the finishing done with a wood float and left free from depressions. Paving shall be kept wet for three days. Cement walks (not used for vehicles) shall be 4 inches thick, of 1:2:4 concrete not reinforced and steel trowel finished with ½ inch of 1:1:1 (cement, sand and No. 2 grit) mortar.

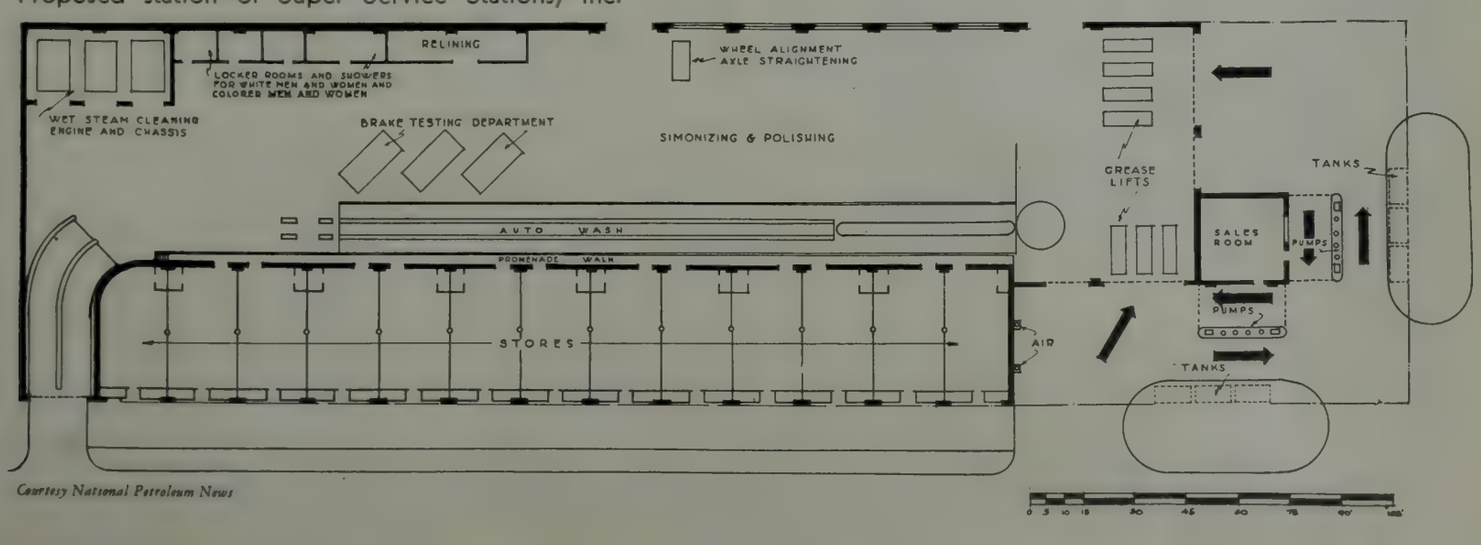


Layout for small station on interior plot and on corner plot. Prepared by Arthur Brace of the Tide Water Oil Company.

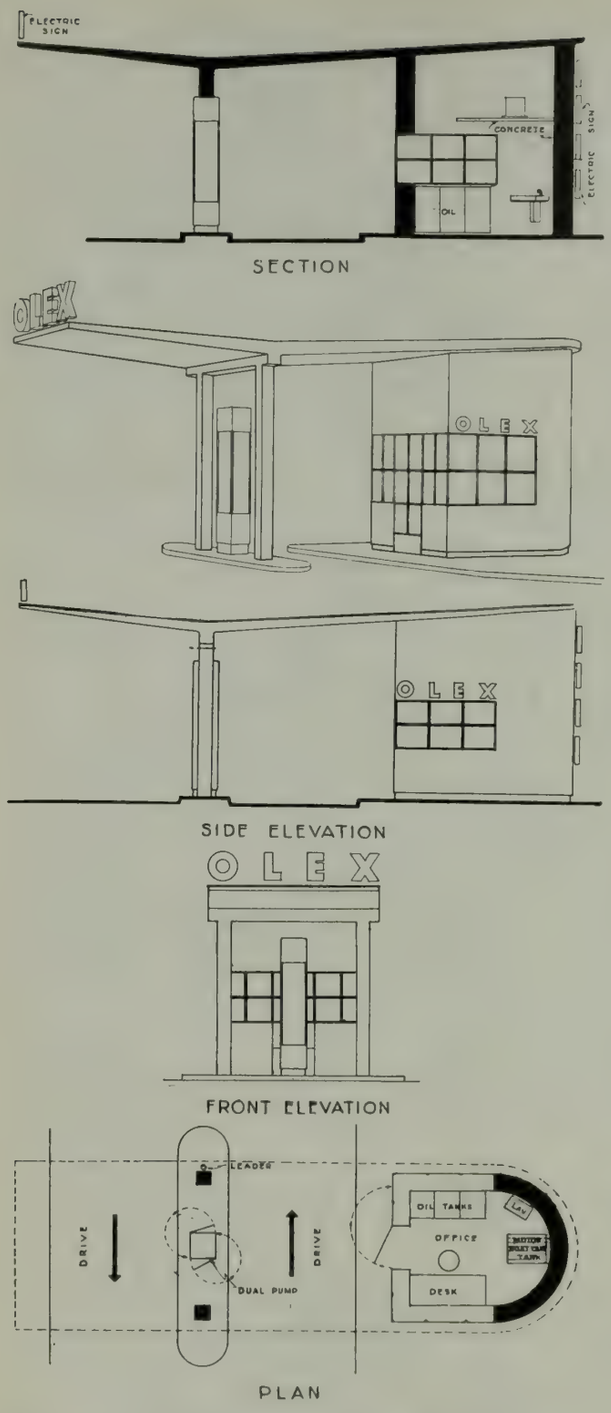


Layout for a small station with the salesroom placed on the pump island. (See text, page 570).

Proposed station of Super Service Stations, Inc.



Courtesy National Petroleum News



Filling Station in Cologne, Germany; Franz Nocker, Architect.

Tanks

1. *Location.*

The location and method of construction of the gasoline storage tanks is in most cases restricted by the local codes. Because of the explosive and inflammable character of the gasoline, the tanks should be underground. The intake should be placed in such a way that the unloading tank truck will not block the operation of the station. The speed of the dumping is influenced by the distance from tank to truck. The tank should be as close to the pumps as possible to reduce the amount of piping and the pull in pumping gas from tank to pump. Future expansion of the station should be considered.

2. *Capacity and number of tanks*

Depend upon the expected gallonage and the size of haul of the tank truck. One separate tank should be placed for each grade of gasoline. The size of the tanks varies between 500 and 3,000 gallons. There is a decided trend to increase the size of the tanks. Large tanks mean quick dumping, and reduced delivery and storage cost.

3. *Installation.*

The tanks should be placed on solid ground or on concrete. The New York code requires that a concrete slab be placed around the tank. Clean earth should be packed all around and on top. Cinders should not be used, because they cause corrosion. Location and height of the vent pipe is determined by code requirements. If possible, the tank should *not* be placed under concrete driveways, to avoid the need of breaking up concrete in case of repair. A manhole should be provided for easy access to the check and foot valves.

Pumps

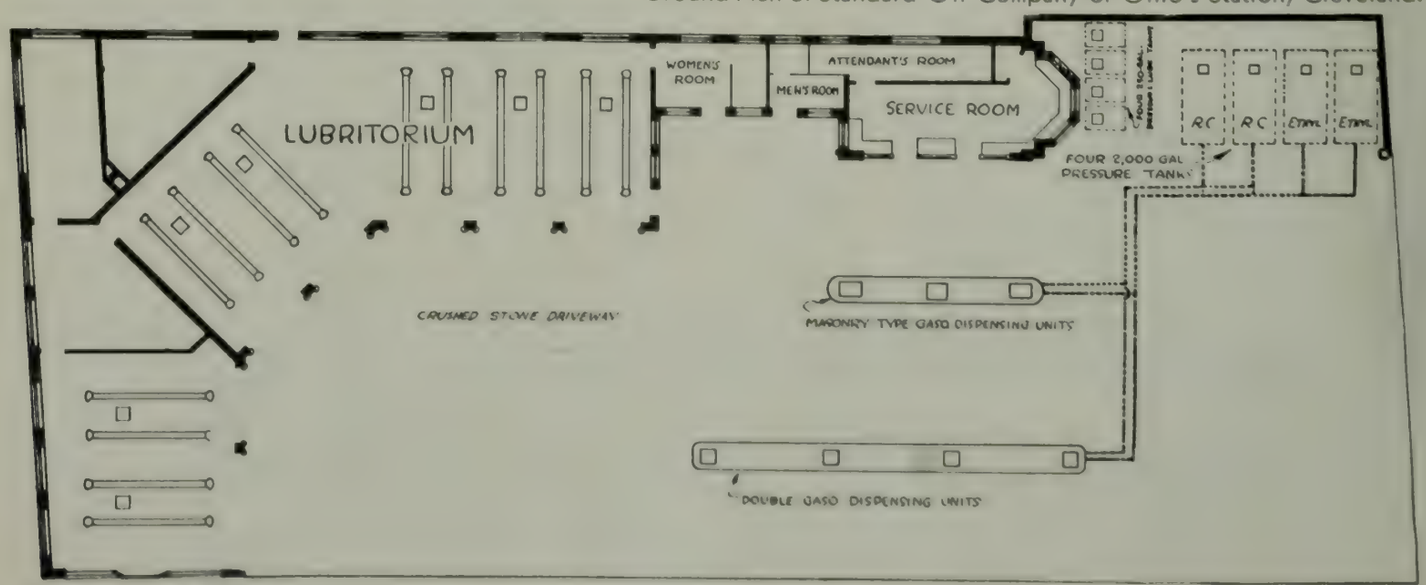
1. *Location.*

Pump accessibility is the most important factor to be considered in the layout of the station. The driveways should give a direct approach from street to pumps.

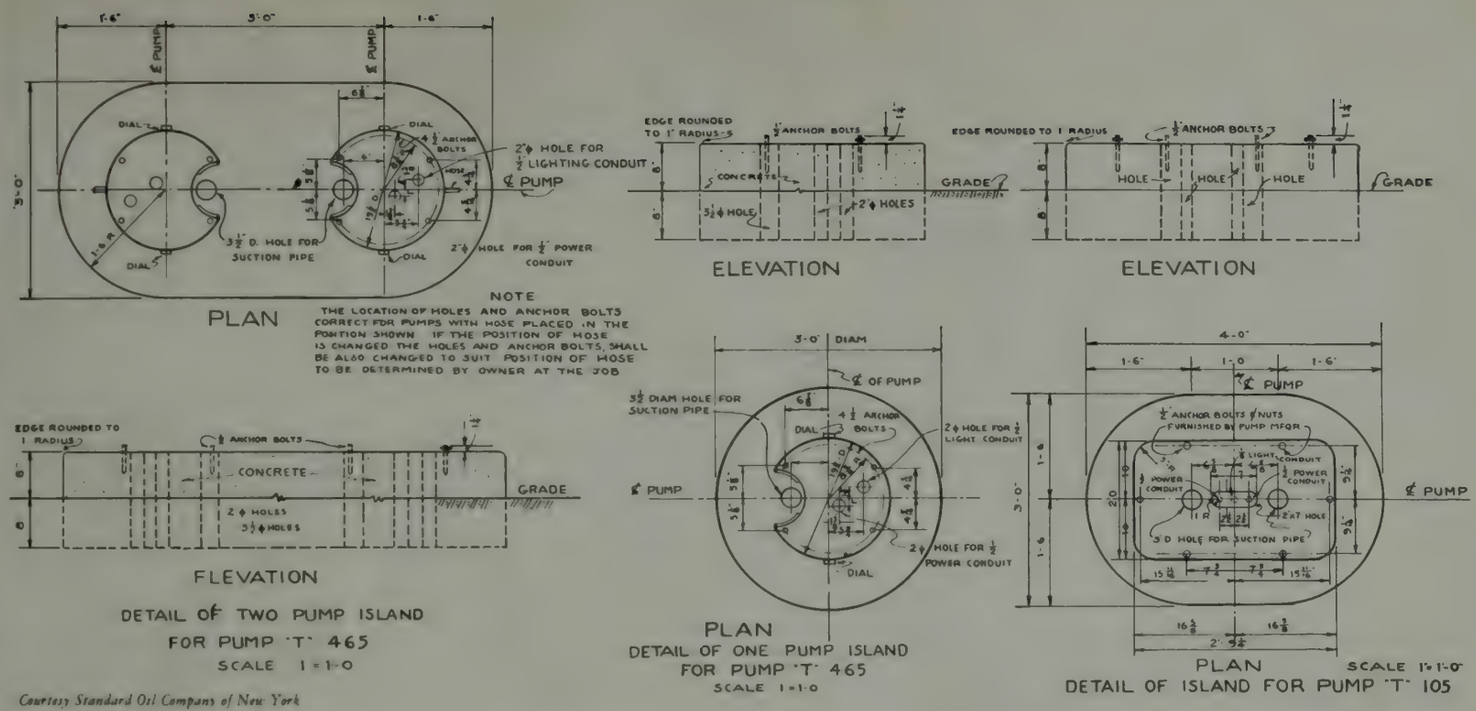
2. *Number, types, capacity.*

One bank of pumps serving two driveways should

Ground Plan of Standard Oil Company of Ohio's Station, Cleveland.



Courtesy National Petroleum News



Courtesy Standard Oil Company of New York

Installation of Pumps.
"All corners should be rounded." (See text, 578.)

contain at least three separate pumps or two tandem pumps, providing two outlets for ordinary gas and one or two outlets for high grade gas.

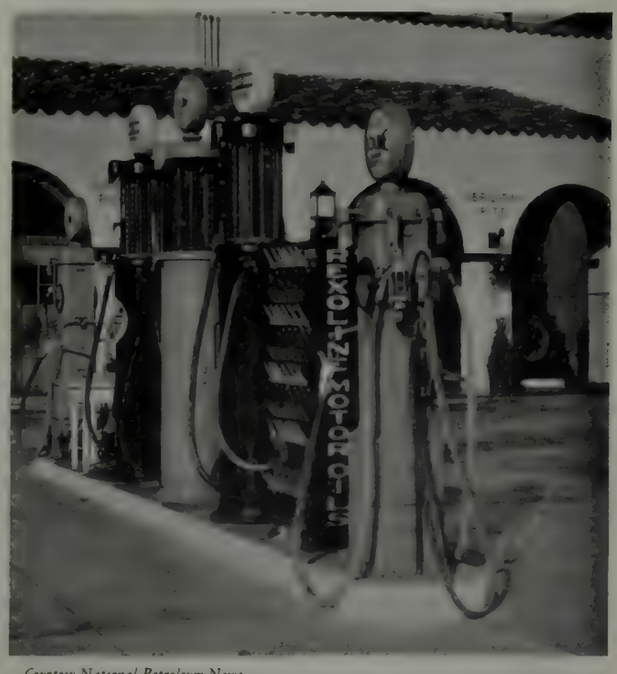
Pumps are either hand-operated, air-operated (with air pressure applied to the tank) or motor-operated (with individual motors or with a central pump station). The pumps are made with single or double discharge (discharge to two sides or for two brands of gasoline), or with four discharges with a corresponding number of meters. The capacity of the pumps varies from one of 7 to 8 gallons per minute for hand-operated pumps to one of 15 to 20 gallons per minute for motor-operated pumps.

3. *Installation.*

The pumps should be placed on concrete islands not less than 6 inches high to prevent danger of collision. All edges should be rounded. Where the space is limited, the islands should follow the curve of the driveways. Oil racks or oil pumps with underground storage tanks are often placed on the islands with the pumps. Clear organization of the visible equipment is essential. The pump islands are the display and deal counters of the station. The form and colors should be organized accordingly.

4. *Canopies.*

Canopies over islands and driveways are used as protection from rain and sun. The columns carrying the canopy should be as slender as possible and without projecting base so as not to obstruct the operation or the visibility. The canopy itself should therefore be constructed of the lightest materials, and possibly be hung from a taller structure. The clear height under the canopy should be not less than 9 feet for the driveways. Open driveways should be provided for tall trucks.



Courtesy National Petroleum News

"The pump island is the display and deal counter of the station."

Salesroom, Rest Rooms, Toilets, Storage

1. *Layout.*

These spaces are usually enclosed in one structure. The entirely distinct functions and requirements of each



Standard Oil Co. of New York, standard stations
1. Colonial wood station in a natural setting



2. Colonial metal station among firewalls



3. Colonial wood station with covered grease pit

The clear and characteristic forms of the visible mechanical equipment: pumps and floodlights are "right" in any surroundings. The architecturally "styled" building becomes an obvious stage-setting when removed from its "natural" environment.



The stations can easily be expanded by adding greasing rooms, repair room, and store room.

of these units might in many cases justify a clear division in the layout. A possible increase in the initial construction cost would be offset by increased efficiency and convenience.

A. SALESROOM. The salesroom serves primarily as an office for the pump operator. It should be located as close to the pumps as possible and should afford an unobstructed view over the pump islands and driveways. The walls should therefore have a maximum of glass area, with the heights determined by the sightlines from the operator's desk. When the salesroom is placed in a single building with the toilets and storage, and placed at the side of the driveway, the operator must cross the traffic to reach the pumps, and again to get back to the cash register. For stations with a continuous sale of gasoline, it might therefore be of advantage to place the salesroom on the pump-island—one salesroom for a group of islands, or one for each island, depending on the number of operators. The toilets and storage can be removed from the vicinity of the driveways. The salesroom should have space for at least the following equipment:

One small steel desk, cash register and safe, one chair, oil rack, display shelf for oil and accessories, and a can for used rags. Telephone, ice water tank, kerosene tank, and lavatory, are often included.

The doors should be located to insure minimum travel from desk to pumps. The size of the salesroom varies with the type of station and the number of operators. Sale of accessories and tires demands increased display space.

B. TOILETS. Toilet facilities included in the station vary from one single toilet for operator and customers in the small city stations to separate toilets for operators and male and female customers, and spacious rest rooms, in the larger types. The toilets should be removed from the driveways to insure maximum privacy. Easy accessibility is important. The entrance to the men's and women's toilets should be separated—if necessary with screens. Doors and windows should not face the driveways, or the working spaces. Abundant natural light should be provided. The toilets should be thoroughly ventilated. Glass should be opaque.

C. STORAGE. Space should be provided for storage of loose equipment, for heating plant, air compressor, and lockers for the operators. This space can be connected with the toilets or with the covered lubrication or repair shop.

2. *Construction.* (See "New Construction Methods," ARCHITECTURAL RECORD, October 1929): The construction should be governed by:

1. *Specific function.*
2. *Initial cost.*
3. *Time of erection.*
4. *Cost of maintenance and cleaning.*
5. *Fire resistance, permanency, flexibility.*
6. *Climatic conditions.*
7. *Local codes.*



Courtesy National Petroleum News

Light, easily erected structures. Rational use of materials. The two stations shown on this page do not pretend to be anything but filling stations. They are good solutions of the specific problem—far surpassing any superficial "architectural styling."

Although a great number of existing stations are built as chain stations and are standard in design, little has been done to develop factory-built units that would satisfy the demand of economy, comfort, and appearance. Sectional steel buildings are on the market, but they have mostly been limited to imitations of stone and wood structures. The advantages of manufactured buildings would be:

1. *Low cost.*
2. *Shorter erection time.*
3. *Higher grade materials and workmanship.*
4. *Elimination of different field contractors.*

(One oil company found that an initial saving in construction cost of $1,000 per station by the use of steel angle frame construction and metal lath and stucco instead of brick and half timber was neutralized, and the actual cost increased, by delay in the field work caused by the larger number of contractors.)

In order to obtain an effective saving, all mechanical fixtures should be installed in the factory. The use of light metals, high grade insulation, or aerated clay products, would cut down the cost of transportation. The varying code requirements, especially in regard to plumbing, are obstacles that must be overcome. Standardized manufactured units should be as "impersonal" in form as the mechanical equipment. All "architectural styling" should be avoided. A standardized design that may seem superficially to "fit" into a rural community becomes a stage setting when it is placed on a city lot between two fire walls. (Illustrations, page 570.)

The cleanliness of the station is equally important for efficient operation and for appearance, and the station should therefore be easily cleaned. Inaccessible spaces should be avoided. All surfaces liable to soiling



Courtesy National Petroleum News



Courtesy National Petroleum News

Curved Grease Pit. The cave below the inside arc provides room for tools and oil tanks under pressure. Steam radiator and light fixtures are visible inside the outer wall. The lift for relaxing springs is overhead.

should be exposed to view. All corners should be rounded, and exposed corners protected with guards. Doors and windows should not open over the driveways. Abundant natural light should be provided.

Pits, Lifts, Repair Shop

1. *Location.*

Pits and lifts for greasing, lubricating, and washing, and space for repair and parking, should be separated from the pump islands. Access and exit should not obstruct the pump accessibility.

2. *Construction.*

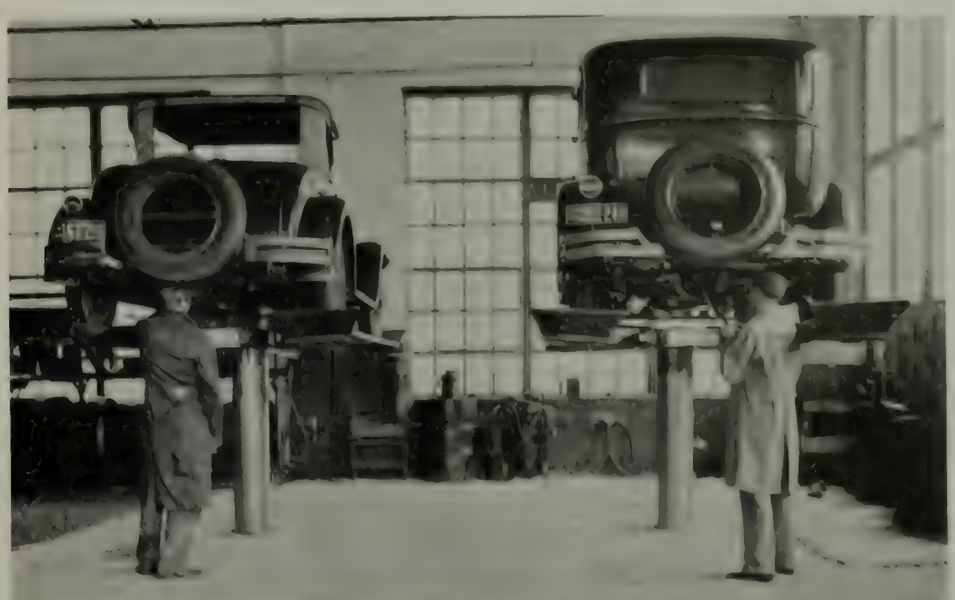
Pits and lifts are equally used. The arguments in favor of the lifts are:

1. *Advertising value of having lubrication in full view of the customer.*
2. *Convenience and cleanliness of work space and surroundings.*
3. *Saving in space by rotation of lift.*
4. *Greater flexibility in the layout (the lifts are easily removed and reinstalled).*

The arguments for the pits are:

1. *Safety in operation.*
2. *Low initial cost.*
3. *Lower building when the work space is enclosed. (The free height should be at least 14 feet when lifts are used.)*

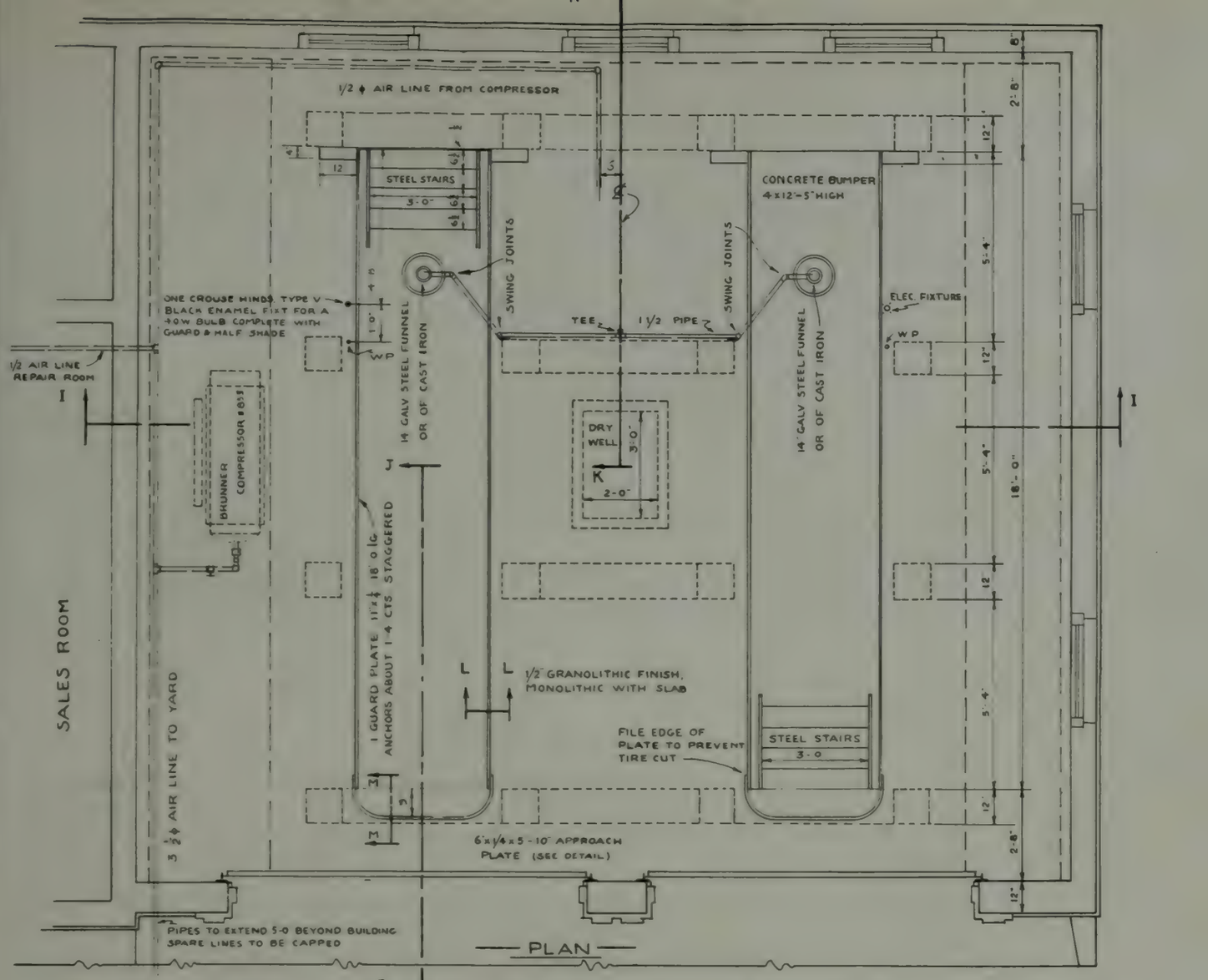
A number of hydraulic and rotating lifts are on the market. The pits are either concrete or steel. Drain pans connected to dry-wells or slop-tanks should be installed with the pits. More efficient work is insured when the pits and lifts and the repair space are sheltered. The construction of the shelter should be governed by the considerations stated under "Salesroom, Toilets, Storage." Ample daylight should be provided. The enclosures and the equipment should be easily cleaned. Vertical supports should be limited to a minimum. Doors should be of folding, sliding, or overhead type. Exposed corners should be round and protected with guards.



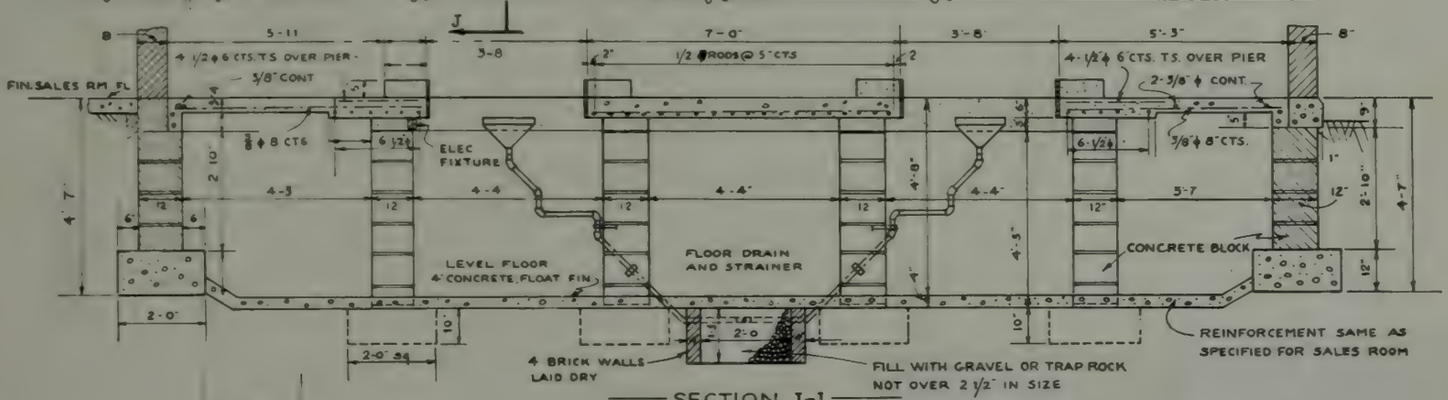
Courtesy Automobile Rotary Lift Company

Hydraulic Lifts

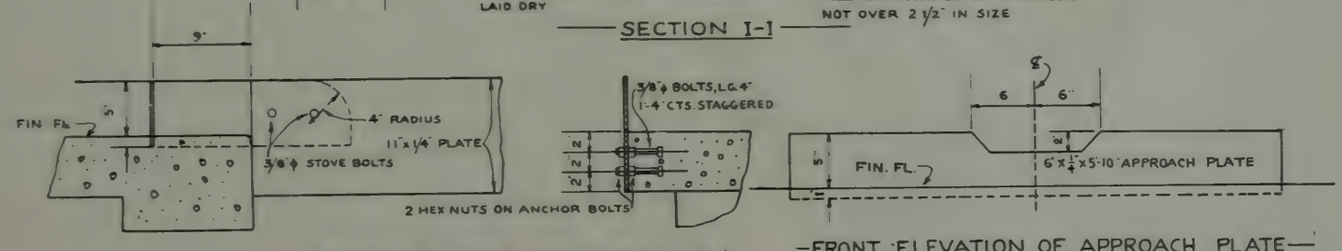
On Right-Hand Page: Construction Details of Greasing Pits



PLAN

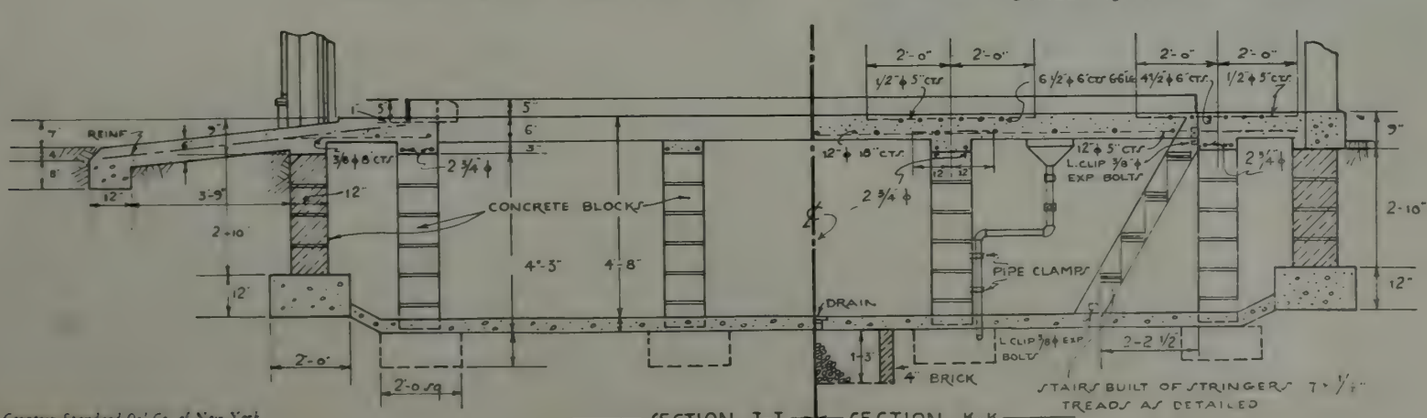


SECTION I-I



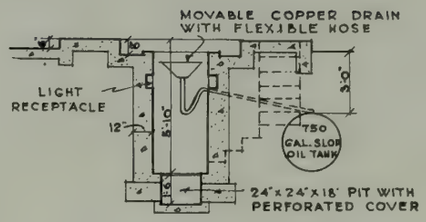
SECTION M-M SECTION L-L

FRONT ELEVATION OF APPROACH PLATE
SCALE 1 1/2" = 1'-0"

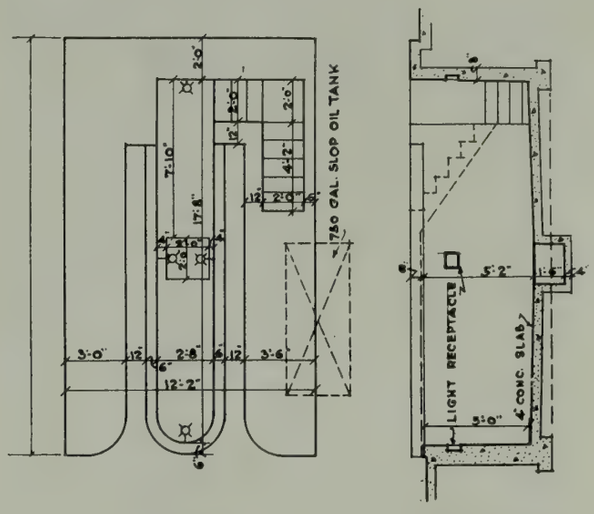


SECTION J-J SECTION K-K

Courtesy Standard Oil Co of New York



SECTION



PLAN SECTION

Detail of Crankcase Pit



Photo. Manning Brothers

Auto Laundry in the Fisher Building, Detroit, Albert Kahn, Inc., Architect

Note the lighting fixtures at floor.

Heating

Electricity, gas, oil, and coal, are used according to local conditions. A central heating plant should be installed in the storage or in the salesroom or in special room. The salesroom and toilets should be heated to 70 degrees in zero weather, and the other enclosed spaces to 50 degrees.

Plumbing

The plumbing system should include:

1. *Drainage for surface water.*
2. *House sewers.*
3. *Water supply for yard water stations, toilets, lavatories, car washing and shop.*

Where there is no sewer connection, a septic tank should be installed, with drain running to filter bed. A water heater should be installed in connection with the heating plant. Fixtures should include: lavatories, closets and slopsink. Chemical closets should be used when city water supply is not available. Soap container, mirror, towels, toilet paper, and waste towel holder, should be furnished for the toilets.

Air System

Compressed air is used for: Air meters and hose lines for tires (the air supply stations should be located away from the pump islands so as not to obstruct the access to the pumps), air operated doors, air hammers, air guns, engine cleaners, grease guns, spring lubricators, tire tools, air lifts, air-operated gasoline pumps, and car washing. The size of compressor and air tank depends on the required service. Compressor and tank can be located in the storage or in the shop.

Lighting

The station should be lighted sufficiently to attract the large percentage of cars operated after dark, and to insure efficient and safe operation. The light should be concentrated on the vital parts of the station. Ramps and driveways should be lighted to an intensity several times that of the surrounding streets, as an invitation to the motorist to drive in. The attention of the approaching driver should be focussed on the pumps. Well diffused light of sufficient intensity should be thrown on all parts of the cars, pumps, lifts, pits, water and air supply stations. The following foot-candle intensities are recommended:

Pump island and work space....	15 f.c. (Min. 10)
Yard and driveways.....	4 f.c. (Min. 2)

1. *Methods of exterior lighting.*

A. OUTLINE WITH BARE LAMPS produces an unpleasant and dangerous glare. Small lamps are inefficient. One 1000-watt lamp generates over twice as much light as forty 25-watt lamps for only half the cost.

B. USE OF STREET LIGHTING units does not eliminate the glare. Part of the light is projected into the streets and on the surrounding buildings, and the desired contrast cannot be created.



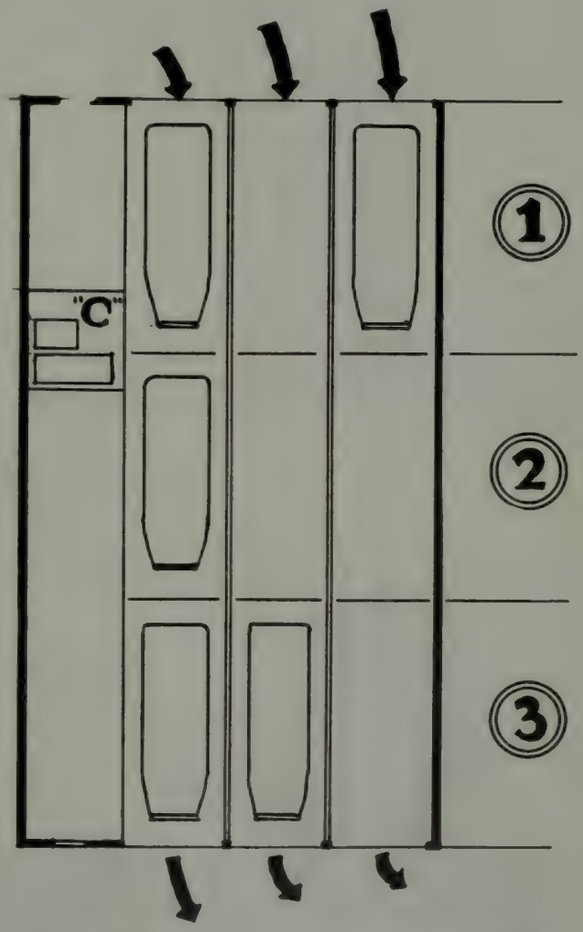
Photo. Manning Brothers

Auto Laundry in the Fisher Building, Detroit, Albert Kahn, Inc., Architect

c. FLOODLIGHTING is at present the simplest and most efficient method used for illumination of the outdoor areas. The greater part of the light can be directed to the desired areas: ramps, driveways, pumps, pits, lifts. The glare can be practically avoided. The lighting is flexible and produces the desired contrast with the surroundings. Colored light can be used.

Two types of floodlights have been developed, for the lighting of filling stations. One is the closed type with mirrored glass reflectors mounted in dust-tight housing with diffusing lens. The other is an open type floodlight with a mat-finish reflecting surface and no cover. The floodlights should be mounted on poles from 15 to 30 feet high. At least two units should be used in order to eliminate shadows. If spotlights are located low or on the ground to light the buildings they should be placed in such a way that glare will be avoided, from the driveways.

The lighting of display case and showroom should follow the principles of good shop-lighting. The salesroom should be sufficiently lighted for easy operation. Pits, lifts, and repair shop, should have outlets for vapor-proof handlamps with tumbler switches in the handles, besides fixtures for general illumination. Entrances to toilets and shop should be clearly recognized. If canopy is used, ceiling reflectors should be installed for lighting the covered area.



Diagrammatic Layout for Auto Laundry

"C" = Air Compressor
1 = Chassis Cleaning Rack
2 = Body Washing Rack
3 = Finishing Rack

SIGNS

Signs should be used to announce the station and the brand of gasoline sold, and to indicate the access ramps. The signs should catch the attention of a driver moving from 20 to 40 miles an hour with his eyes on the traffic, and should be easily discerned among the variety of forms and colors of the streets and highways. They should be equally legible at day and at night from 500 to 600 feet ahead to give the driver time to react. (A traffic signal should be legible at a distance of 200 feet.) The legibility of the sign depends on its location and the design.



Closed Type Floodlighting Fixture, Westinghouse Lamp Company



Open Type Floodlighting Fixture, Crouse-Hinds Company



Closed Type Floodlighting Fixture, Crouse-Hinds Company

1. *Location.*

Signs placed too high or too low are easily overlooked. The low sightlines and the narrow angle of visibility of the modern car must be considered. The signs should be above the heads of the pedestrians and far enough from the ground to keep children from climbing them. The reading surface of the sign can be sloped towards the driver. Surroundings, and the location of competing signs, should be considered.

2. *Design.*

Visibility is a result of the proper combination of at least four variables—size, contrast, brightness, and length of exposure. Size, color, and shape, are the fundamental elements of a sign. Size is the most important, color the next important, and shape the least important. Signs can be so large as not to impress the driver. The sign must fit into the picture as a unit.

"In the control of traffic, vision and its more common defects must be considered. Shapes and color are the chief fundamentals of a signal. . . . The shape alone is of very doubtful value, because a signal should be recognizable at a reasonable distance. Quite an appreciable number of persons have vision so defective that they cannot accurately distinguish shapes at a distance. However, this difficulty is not found in the recognition of certain colors. It is contended that about four per cent of the people are color-blind, but this statement is as misleading as it is indefinite. . . . It is exceedingly difficult to find a person who cannot distinguish the two colors red and blue-green as being different. Persons experienced in color-vision believe that perhaps no more than one in a hundred thousand persons would have difficulty in distinguishing these two colors. However, it is likely that a thousand times more persons have eye-defects so serious as to make shapes unrecognizable at a reasonable distance. Furthermore, fog, rain, smoke, and dust, often obliterate shapes when under the same conditions a powerful luminous color-signal would still be seen as a spot of colored light. After utilizing color, the most powerful and practical aspect of light for traffic signals, it may be well to take advantage of form. With colored signals, this may be largely a matter of position. For example, we may have a horizontal line of red lights and a vertical line of blue-green lights. . . . Intensity, of course, is another factor upon which attention-value depends, but the mistake is often made of depending upon photometric measurements or candlepower for determining this phase of attention value. Here we encounter something akin to glare . . ." *

The principles for traffic lights quoted above should be applied to the design of signs for filling stations. The design should be based on the attention-value of elementary contrasting colors and shapes, and on the direction the shape takes. A vertical form is in itself a stop signal in a street with horizontally moving traffic. A horizontal or sloping form will deflect the attention to the access ramp. An easily recognized trade-mark is more

* Luckiesh: Light and Work

valuable than words. Lettering should therefore be limited to a minimum, and the design of the letters be based on the same principles. Moving light effects should be limited to slow motion to contrast with the fast traffic. The attention-value of different colors varies with the background. On a white background, the colors can be arranged according to their attention-value in the following sequence: red, black, green, orange, blue, purple, yellow.

The size of letters for clear visibility depends upon color, background, atmospheric conditions, spacing, and design. The Flexlume Corporation uses the following averages:

4-inch letter legible at a distance of 200 feet
8-inch letter legible at a distance of 400 feet
12-inch letter legible at a distance of 675 feet
24-inch letter legible at a distance of 1300 feet

The signs should be designed for equal legibility at day and at night. The painted, flat, or plastic sign can be floodlighted. Neon-light tubes can be applied to the letters and used for outlining the sign. Combinations of glass and metal offer new possibilities. Photo-electric cell control will light the sign whenever daylight fails and regardless of the time of the day.

3. *Signs in the Yard.*

Access to the various units should be clearly indicated. Signs, strips painted on the driveways, mushroom lights, or neon light tubes indicating the traffic lines can be used, and will in many cases cause the waiting driver to decide on extra service. The different brands of gasoline should be clearly shown on the pumps. All signs located in the yard for the information of the driver should be placed low and in relation to their visibility from the car. If they are placed on the ground, they should be tilted, and located on the driver's side of the car.

Display

Display cases for accessories should be located at the part of the driveways where the cars stop, or along the approach. They can be placed on the islands or in the adjoining building. The arrangement of the display should be governed by the visibility from the car, and the height of the case should correspond to the height of the car window. The case should be lighted at night. Contrast with the background is important. The light should be concentrated on the display, and if the case is placed in the building it is advisable to keep the surface of the building dark.

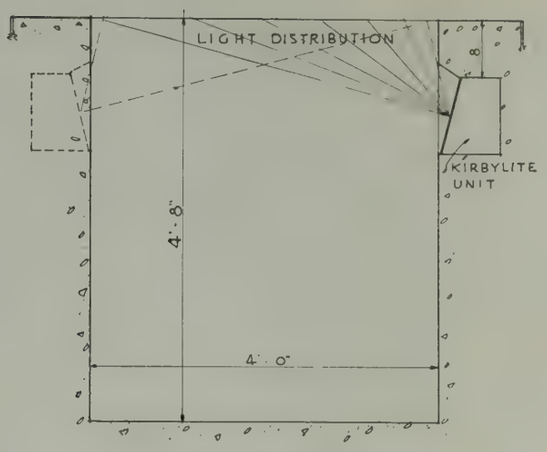


Neon Light Sign for a station in California. (See page 584).

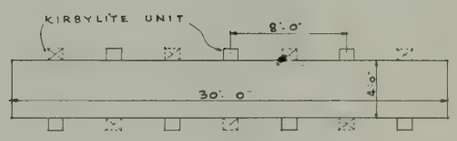


A Good Sign. But note the glare caused by lights of the station. (See text, page 574).

Courtesy Claude Neon Lights, Inc.

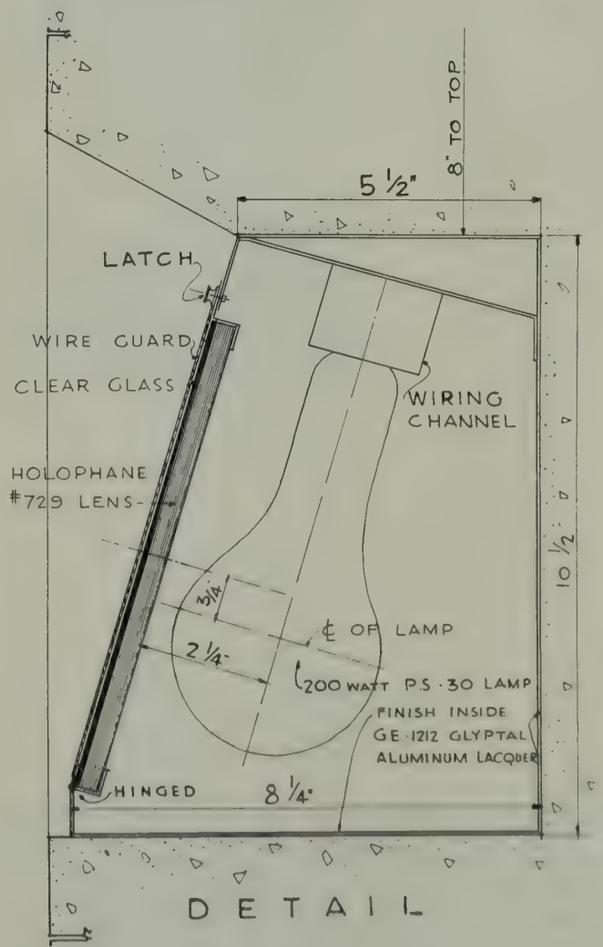


SECTION



NOTE:
FOR MODERATE INTENSITY USE 7 UNITS
FOR HIGH INTENSITY USE 14 UNITS.

PLAN



DETAIL

Oil Pit Illumination, L. Erikson Electric Company, South Boston, Mass.

Material

1. *All materials used for buildings, equipment and fixtures should be manufactured and transported with minimum cost.*
2. *They should be easily erected, replaced, and repaired.*
3. *They should be of such durability as to withstand hard use and the bumping of cars and movable equipment.*
4. *Exposed surfaces should be non-absorbent to oil and grease, and resistant to the chemical action of gasoline. Cement floors should be treated with a filler to prevent staining.*
5. *They should be resistant to fire and water. All metals should be non-corrosive.*
6. *All surfaces should be easily cleaned.*
7. *The number and quantity of materials used should be reduced to a minimum for the sake of economy and visual unity.*

Form

The plastic forms of buildings, equipment and fixtures should be determined by the following criteria:

1. *Maximum appeal to the driver.*

The attention value of form, form-relation and form-direction has been discussed above. Elementary forms are easily read. Ornaments and decorations should be avoided.

2. *Maximum ease and certainty of operation.*

Sharp, projecting forms should be avoided. Vertical supports should be limited to a minimum and all corners should be rounded.

3. *Minimum cost of construction and maintenance.*

All forms should be easily made and easily cleaned. All surfaces should be smooth for effective cleansing action of flush-water.

4. *Maximum plastic unity.*

The characteristic plastic value of the station depends upon the clear spatial organization of a number of decidedly differentiated units. The visual unity should be insured by the repeated use of elementary forms.

5. *Organic relation to surroundings.*

The standardized station should fit into varying surroundings. All "architectural styling" should therefore be avoided.

Color

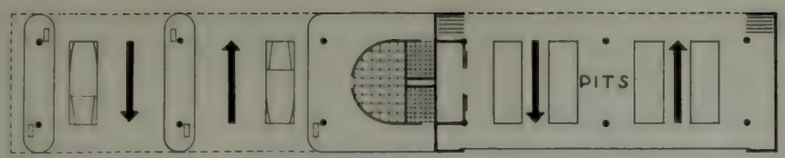
Integral color, pigment-color and colored light—including the white, gray, black values—should be used:

1. *To increase the appeal to the driver.*

The attention-value of color and color contrast has been discussed above. Elementary colors in concentrated areas have a high attention-value. The driver should easily recognize the station. A definite color scheme should therefore be adopted. The color scheme should be extended to the lighting.

2. *To increase the ease, certainty, and safety of operation.*

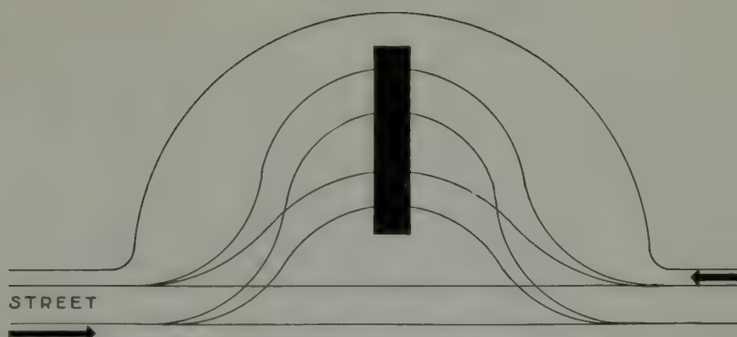
Elementary colors are easily recognized. The colors should be organized to emphasize the various functions of the station. Pumps, lifts, air and water supply stations, shop, and access to toilet, should be clearly indicated, according to their importance. The pumps are the vital units of the station; their color should therefore have the highest attention-value. Auxiliary units such as toilets and storage should be less pronounced.



PLAN



ELEVATION



PLOT PLAN

Working spaces and indoor mechanical equipment should have light-reflecting surfaces. Piping and conduits should have clear color indications. Ramps, curbs, and islands should be clearly marked with striping or contrasting colors.

3. *To facilitate the clean appearance of the station.*

The lower part of doors and walls in the shop should be dark so as not to show the unavoidable grease and oil stains. Toilets and salesroom should have colors that will make the presence of dirt easily detected.

4. *To increase the visual unity.*

The number of colors should be limited to a minimum. The colors should be organized to tie the various units together in a clear spatial relationship.

LANDSCAPING

Landscaping for rural or suburban stations should not interfere with the operation or the clear visibility. The natural colors should be organized with the color-scheme for the station. Plant materials should be such as are not affected by gasoline fumes.

COST AND RELATIVE VALUES.

Cost varies with location, size and construction. The construction cost of a typical small filling station can be divided approximately among the following items:

1. *Yard.* (This includes ramp, driveways, pits, landscaping, improvements, sewers. Pumps and tanks are charged to operation cost)..... 40%
2. *Buildings*..... 40%
3. *Equipment*..... 15%
4. *Lighting and Signs*..... 5%

The commercial value of the station can be divided between:

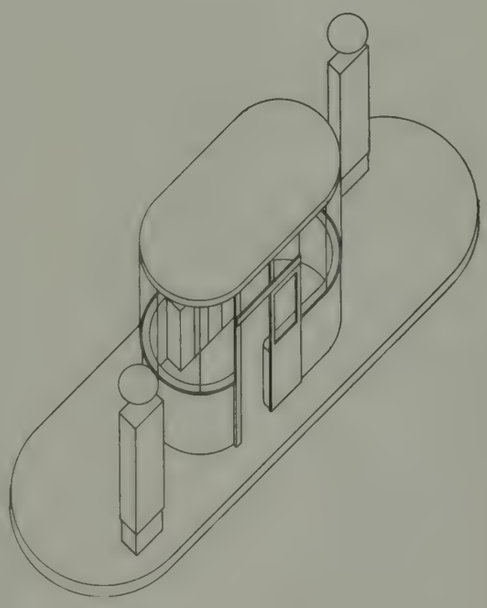
1. *Pump accessibility.*
2. *Attendance.*
3. *Appearance.*
4. *Signs and lighting.*

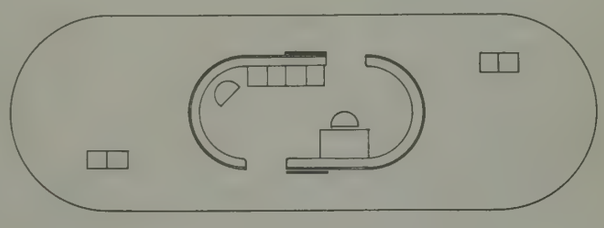
A number of interrelated factors make an exact general division difficult. The essential purpose of the station is the sale of gasoline.

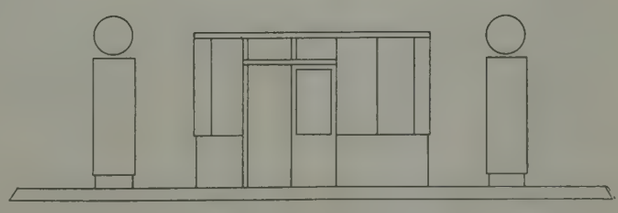
Pump accessibility counts most and can be rated to 50% of the total value. Attendance can be rated at 25%. Appearance of signs and lighting to 25%. Good attendance may offset a poor layout and may increase the sale of gasoline 50%. Rational use of light, color, and form, together with more economical construction, may increase the commercial value of the station without additional cost.

Filling and Service Station along a motor highway.

Materials: Aluminum alloy and glass. The pits are enclosed with sliding doors. Salesroom, toilets, and storage, are placed between the filling and service units. K. Lönberg-Holm, Architect.







Salesroom placed on the pump island. (See text, page 570).

Factory-made units of aluminum and glass, easily assembled in the field. K. Lönberg-Holm, Architect.

CHECKING LIST

1. *Design*
- Maximum appeal to the driver
- Maximum ease, certainty, and safety of operation
- Minimum cost of construction, maintenance, and operation
- Maximum plastic unity of the basic units
- Maximum organic relation to the community

2. *Location*
- Traffic and community survey
- Relation to traffic
- Visibility
- Relation to shopping centers, business centers and recreation centers
- Accessibility
- Future expansion

3. *Layout.*
- Separate handling of each operation

4. *Ramps, Driveways and Yard*
- Traffic diagram
- No sharp turns
- Width of ramps
- Parking space

5. *Tanks*
- The unloading tank truck must not block the operation
- Minimum piping
- Future expansion
- Local codes

6. *Pumps*
- Accessibility
- Number of outlets
- Height of islands
- Canopy. Slender supports. Height

7. *Salesroom*
- Proximity to pumps
- Location of doors
- Unobstructed view
- Loose equipment

8. *Toilets, Restroom.*
- Accessibility
- Remove from driveways
- Separation of entrances to men's and women's toilets
- Abundant natural light
- Ventilation

9. *Storage*
- Loose equipment, heating plant, compressor and lockers

10. *Construction*
- Specific functions
- Initial cost
- Time of erection
- Cost of maintenance and cleaning
- Fire resistance, permanency, flexibility
- Climatic conditions
- Local codes
- Inaccessible spaces to be avoided

11. *Pits, Lifts, Repair shop*
- Separation from pump islands.
- Drain pans
- Ample daylight when sheltered
- Vertical supports limited to a minimum.
- Doors: folding, sliding or overhead

12. *Heating*
- Individual requirements of each unit

13. *Plumbing*
- Drainage for surface water
- House sewers
- Water supply for yard water stations, toilets, lavatories, car washing and shop
- Slopsink
- Soap container
- Mirror
- Towels
- Toilet paper
- Waste towel holder

14. *Air system*
- Air meters and hose lines
- Air operated doors
- Air hammers
- Air guns
- Engine cleaners
- Grease guns
- Spring lubricators
- Tire tools
- Air lifts
- Air operated gasoline pumps
- Car washing
- Air stations to be separated from the pump islands

15. *Lighting*
- Attention-value
- Efficient operation
- Concentration on the vital units
- Flexibility
- Avoid glare
- Colored light
- Elimination of shadows on working spaces
- Vapor-proof handlamps for pits, lifts, and repair shop
- Ceiling reflectors for canopies

16. *Signs*
- Size
- Low sightlines of modern cars
- Should announce the brand of gasoline sold
- Attention-value of color, form
- Minimum lettering
- Background, surroundings
- Equal legibility at day and at night
- Clear indication of the various units
- Visibility from the driver's seat

17. *Display*
- Location
- Visibility from the car
- Lighting
- Contrast with background

18. *Materials*
- Cost
- Repair and replacement
- Durability
- Non-absorbent to oil and grease
- Resistant to chemical action of gasoline
- Resistant to fire and water
- Metal non-corrosive
- Easy cleaning
- Limited number of materials

19. *Form*
- Elementary forms
- No ornaments or decorations
- Sharp projecting forms to be avoided
- Corners rounded
- Minimum vertical supports
- Easy cleaning
- Smooth surfaces

20. *Color*
- Elementary colors
- Easily recognized color scheme
- Lighting
- Clear indication of the various functions
- Light reflecting colors for workspaces
- Clean appearance
- Visual unity
- Limited number of colors

21. *Landscaping*
- Visibility
- Colors
- Resistance to gasoline fumes



White Star "Master Service Station," Detroit. Good utilization of a narrow corner lot. Easy access to pumps and shop. Clear separation of filling and service areas. Materials: White and black glazed tiles. Note the use of black for the lower part of the doors that soon become dirty.

The station is easily cleaned, and looks clean. The canopy columns are unnecessarily heavy. The attention value of the false roof (blue metal shingles) could have been obtained in a more simple and economical way by the use of colored tiles for the upper part of the wall, thus eliminating roof, shingles, and gutters, reducing the number of contractors, and at the same time increasing the visual unity.

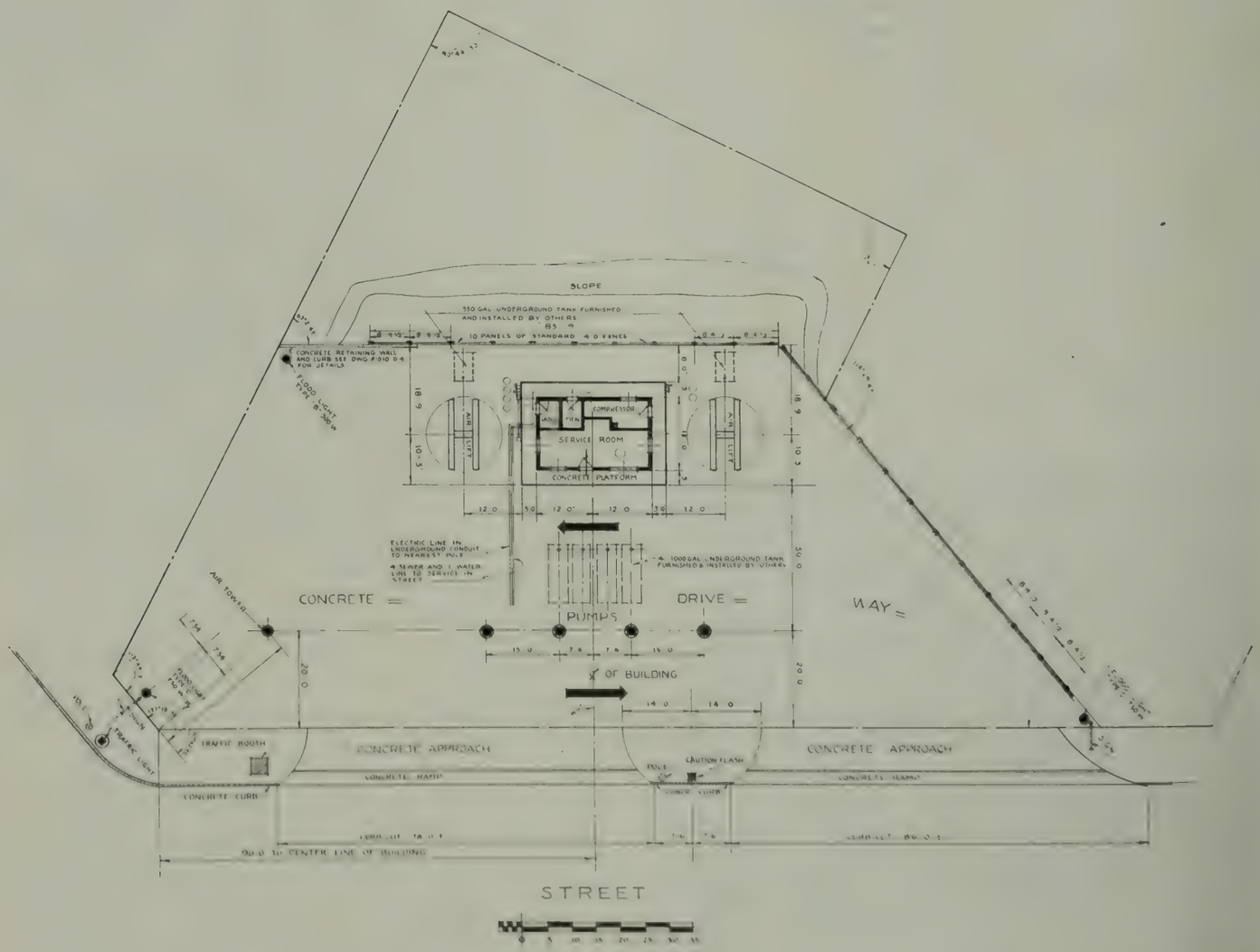
The visible light globes cause dangerous glare. The clearly differentiated units are tied together by the color scheme and by the repeated use of rectangular forms.



Service Station in Desplaines, Illinois. R. Harold Zook, Architect. Zook and McCaughey, Associated, Architects.

A picturesque station that fails to conform with the utilitarian pump and with the firewall at right.





Tide Water Oil Company filling and service station in Camden, N. J.

Clear layout of interior plot. The station is visible from two streets. Easy access to pumps and lifts. Ample parking space. Clear arrangements of pumps and driveways. The steep roof, the heavy wood door, and the fenestration (which impairs the visibility from the operator's room) are unnecessary sacrifices to a false "architectural styling."



Filling Station built by Westchester County Park Commission for Hutchinson River Parkway, Penrose Stout, Consulting Architect, Gilmore D. Clarke, Landscape Architect.

Total cost	$12,500 (building only)
Building	10,000
Mechanical equipment	2,400
Signs and exterior lighting	100

Two of the supply pumps are housed in the building. The two others are hidden in a lattice-work structure placed on top of a stone curb, the whole having the outward semblance of a well of water on some well kept New England farm. The compressed air-standards are without reason boxed in to resemble old-fashioned hand-pumps with the familiar long wooden handle. The building and pumps are located well off the parkway drive with paved entrance and exit drives and a service area. The landscape treatment includes shrubbery that in time will screen the station completely.



FLOOR PLAN

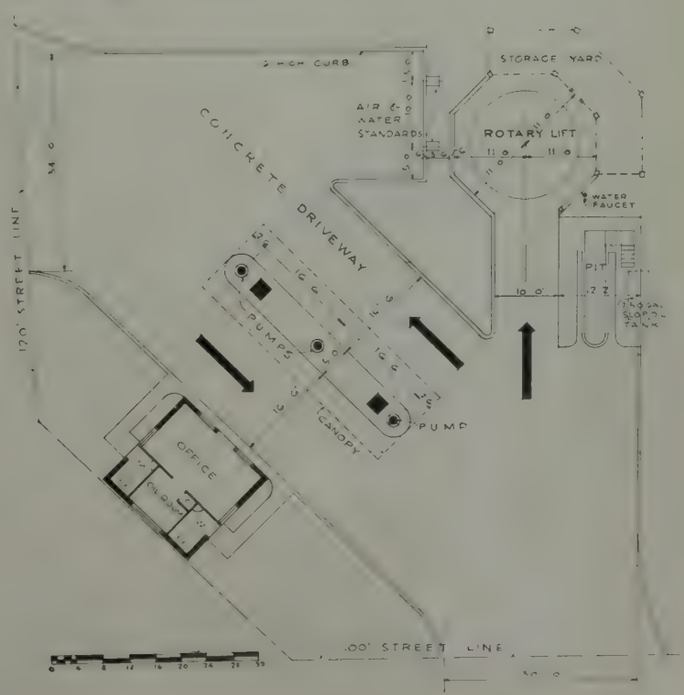
Filling and service station built for Radburn, N. J. (the new town for the motor age) by the City Housing Corporation, Clarence S. Stein, Architect.

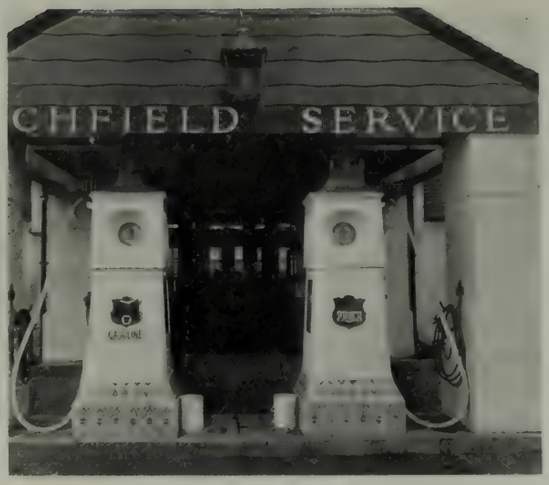
Total cost	$35,000
Site	17,000
Driveways, etc	6,000
Buildings and signs	12,000

Note: The above represents owner's investment. The tenant has also installed supplementary lighting and mechanical equipment.

There is no apparent justification for the steep roof. The unnecessarily heavy canopy columns impair visibility and pump operation. The operator is not able to see approaching cars from the salesroom. The forced symmetry of the design makes no distinction between the windows for the salesroom and the toilet entrances.





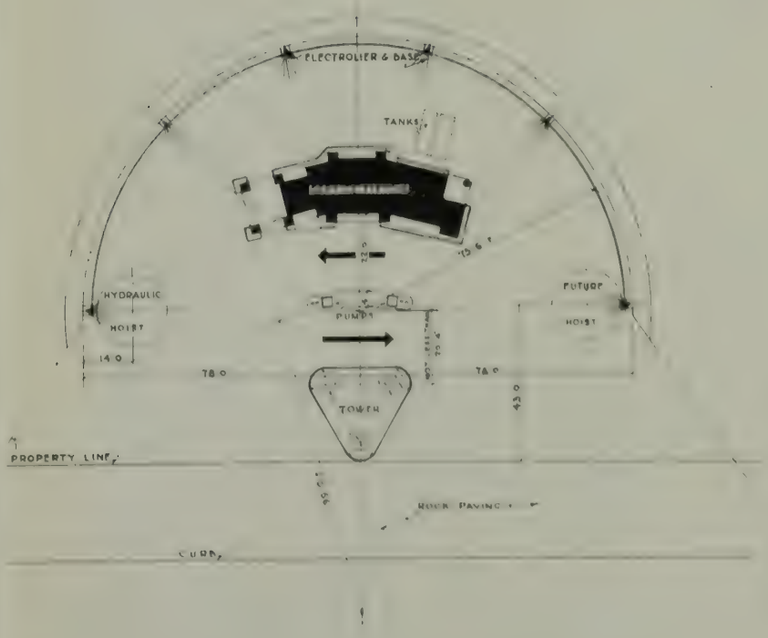












Service Stations along the major highways of California, Oregon and Washington by the Richfield Oil Company are links in a chain designed to reach from the Mexican border to Canada. The 125-foot Neon-light airplane beacon towers are a part of each station and intended to guide air liners and motorists. The stations were planned as nuclei for future community developments.

The semi-circular layout provides an easy flow of the traffic, but there is a complete lack of form relationship between the utilitarian construction of the slender steel towers and the unnecessarily heavy, picturesque architectural "effect" of the buildings. The stations are clear examples of "the often conflicting interests of commerce and community." The buildings have been "styled" architecturally for the sake of a superficial uniformity in the future community development. But the commercial spirit of the tower advertising shows a complete disregard for community rights.

METAL WALLS COMING

ADDING

"Nearly a square foot of rentable floor area per running foot of exterior wall"

"Net income of $2 to $7 per running foot of wall"

CUTTING DOWN

Erection time

Heat loss

Extra weight

Wasted space

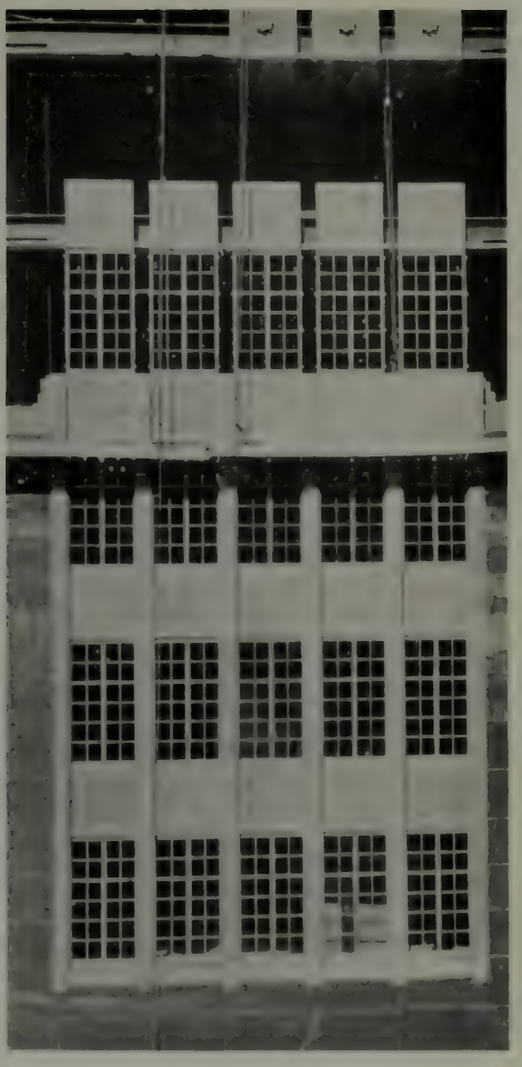
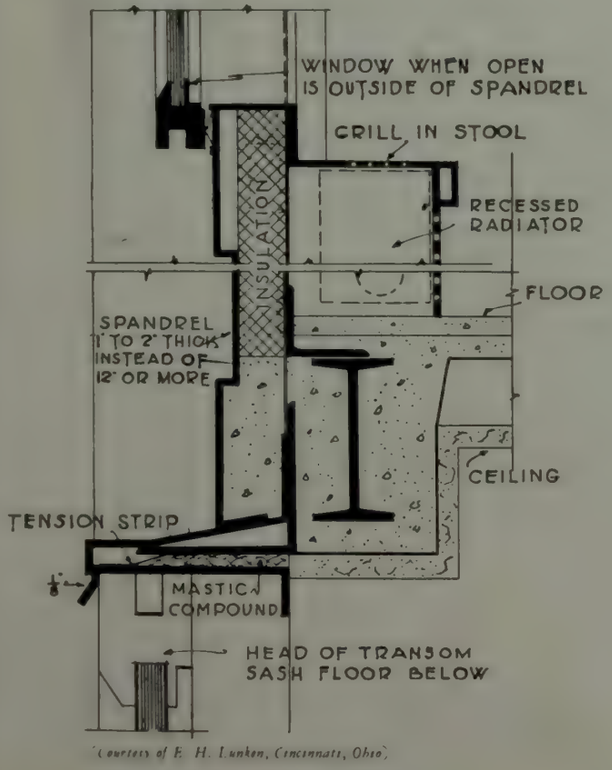


Photo shows metal spandrels with 12-inch brick backing in process of erection, Hollander Building, New York City; Shreve, Lamb and Harmon, Architects



(Courtesy of E. H. Lunken, Cincinnati, Ohio)

In the Hollander Building, New York City, the architects have gone a long step forward in the logical use of metal spandrels.

"From the progress photo shown," says Mr. Lamb, "one can see what a simple matter it would be to eliminate masonry walls entirely as soon as the building code is changed to permit such construction. The introduction of rustless metals which do not require painting is opening up a new field for improvement in building construction.

"A metal wall such as that shown in the progress photo if backed by proper fireproof insulation would save in erection time, save heat loss, and, of greater importance from the standpoint of the client, would add nearly a square foot of rentable floor area per running foot of exterior wall. This would mean an added *net* income, depending on location, of $2 to $7 per running foot of wall per floor per year, in addition to a lower first cost for the building."

The Next Step: A metal spandrel with insulation backing but with no masonry.

THE ARCHITECT'S LIBRARY

MODERN ARCHITECTURE

HENRY-RUSSELL HITCHCOCK, JR.

Modern Architecture: Romanticism and Reintegration. Payson and Clarke, Ltd., New York, 1929. $10.00.

The time has long been ripe for just such a book for general reading as this by Mr. Hitchcock, whose long journeys and European friendships are happily connected with architecture and especially with the very latest movement in modern architecture abroad. Comparing his book with Fiske Kimball's *American Architecture* the American reader may get two entirely different aspects from two eminent American critics of some of the most interesting current problems. The increasing interest in the development of modern architecture will be very much helped by this book, which is written by an American with more than an American outlook on the question.

Mr. Hitchcock shows with a rare clarity the two expressions architecture takes today with their respective origins going back to the period of 1750–1800 when architecture decidedly separated from the past. The author's deep understanding of European psychology explains the high quality of his work. Seldom has the movement of the "New Pioneers," as he calls the group including names like Le Corbusier and Gropius, been shown with such clear relation to the past; rarely is the intellectual background of European architecture better explained.

Mr. Hitchcock shows, in his three chapters with their excellently chosen pictures, the age of Romanticism, the movement of the "New Tradition," and the "New Pioneers." He points out the important difference between the representatives of the "New Tradition" who believe in rearranging and redeveloping the classical forms, still using engineering and materials in an eclectic way as a subsidiary means to the end; while the "New Pioneers" take the "lesson of the engineer" and new materials as a basis on which they develop new architectural conceptions and forms. Mr. Hitchcock follows the development from the last European style, the Baroque, through a romantic, slavish copying of Gothic and Greek in the early part of the 19th century, to the "New Tradition," a movement which appeared as soon as architects turned from the "eclecticism of taste" to the "eclecticism of style" with the intention of founding a rational and integrated manner. He analyzes very cleverly this interesting period when the Classical Revival, because of the activity of the rationalists and the coming to terms with the Mediaevalists, was finally dissolved in the eclecticism of taste all over Europe and America. The Classical Revival, the Mediaeval Revival, the big new factor of engineering, an heroic conflict of new forces, the birth hour of something entirely new.

In the second half the book finally shows the deep result in the movement of the modern pioneers. These men, Le Corbusier and Lurcat in France, Gropius, Mies van der Rohe in Germany, Oud in Holland, Vesnin and Bouroff in Russia, represent entirely new possibilities at a moment when the "New Tradition" is coming to a dead point. Mr. Hitchcock sees clearly the important influence of this young movement on the future architecture of America. He certainly uses a language very new to most of the architectural historians. It is finally of greatest interest to see an architectural discussion removed from the sterile level of analyzing in terms of styles.

The author finishes his excellent book with valuable bibliographical notes up to the latest moment. His study in its completeness and thoroughly sharp analysis of the subject is the best English book on the increasingly important problem.

O. G. STONOROV.

COLLEGE ARCHITECTURE IN AMERICA AND ITS PAST IN THE DEVELOPMENT OF THE CAMPUS

CHARLES B. KLAUDER AND HERBERT C. WISE

Chas. Scribner's Sons, publishers, $5.00 (revised by Aucotton).

MESSRS. KLAUDER AND WISE discuss at length and generously illustrate the different kinds of collegiate institutions and their requirements; the different kinds of buildings—dormitories, classroom and lecture buildings, libraries, museums, chapels and auditoriums, dining halls, administration buildings, buildings for engineering and the natural sciences, for athletics, and for student and faculty welfare. The list only partly suggests how highly organized and how complex is the modern American University; and what a problem an architect has who has a new university to plan and who wishes to give architectural unity to its diverse demands. On a level site, a symmetrical scheme is generally conceded to be most appropriate, whereas a rugged irregular site generally requires irregular groupings. Annapolis and West Point are instances of these. In western colleges, there is now an imperious demand for parking space for automobiles, which suggests how rapidly "college requirements" are changing. The modern college dormitory has almost as many shower baths as students, and most professors seem to have stenographers. No doubt the students are cleaner and the professors more business like. At any rate, college architecture is improving and collegiate buildings seem destined to become as characteristic of the future America as monastic buildings were of mediaeval Europe.

A. W. COLTON.

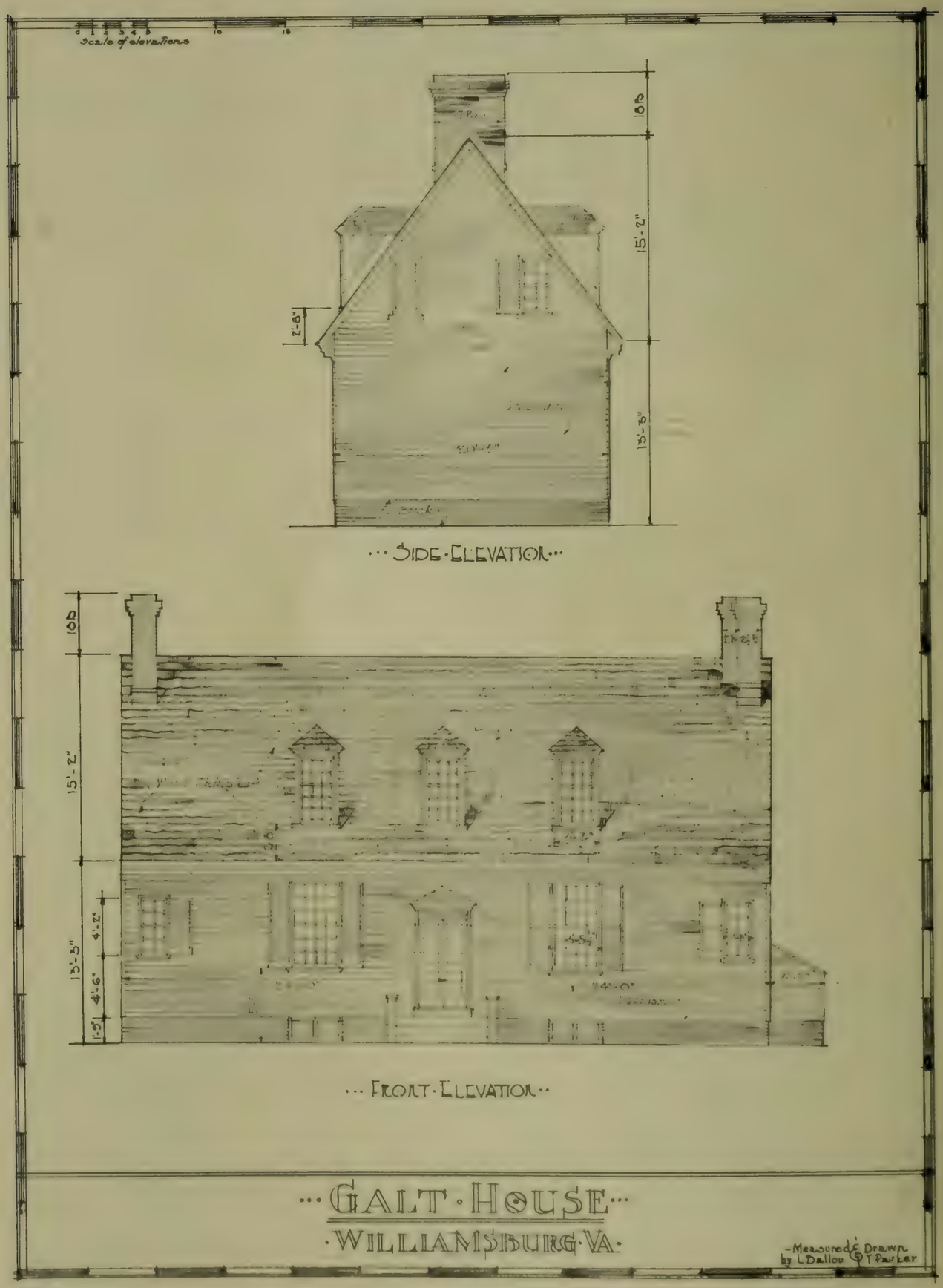
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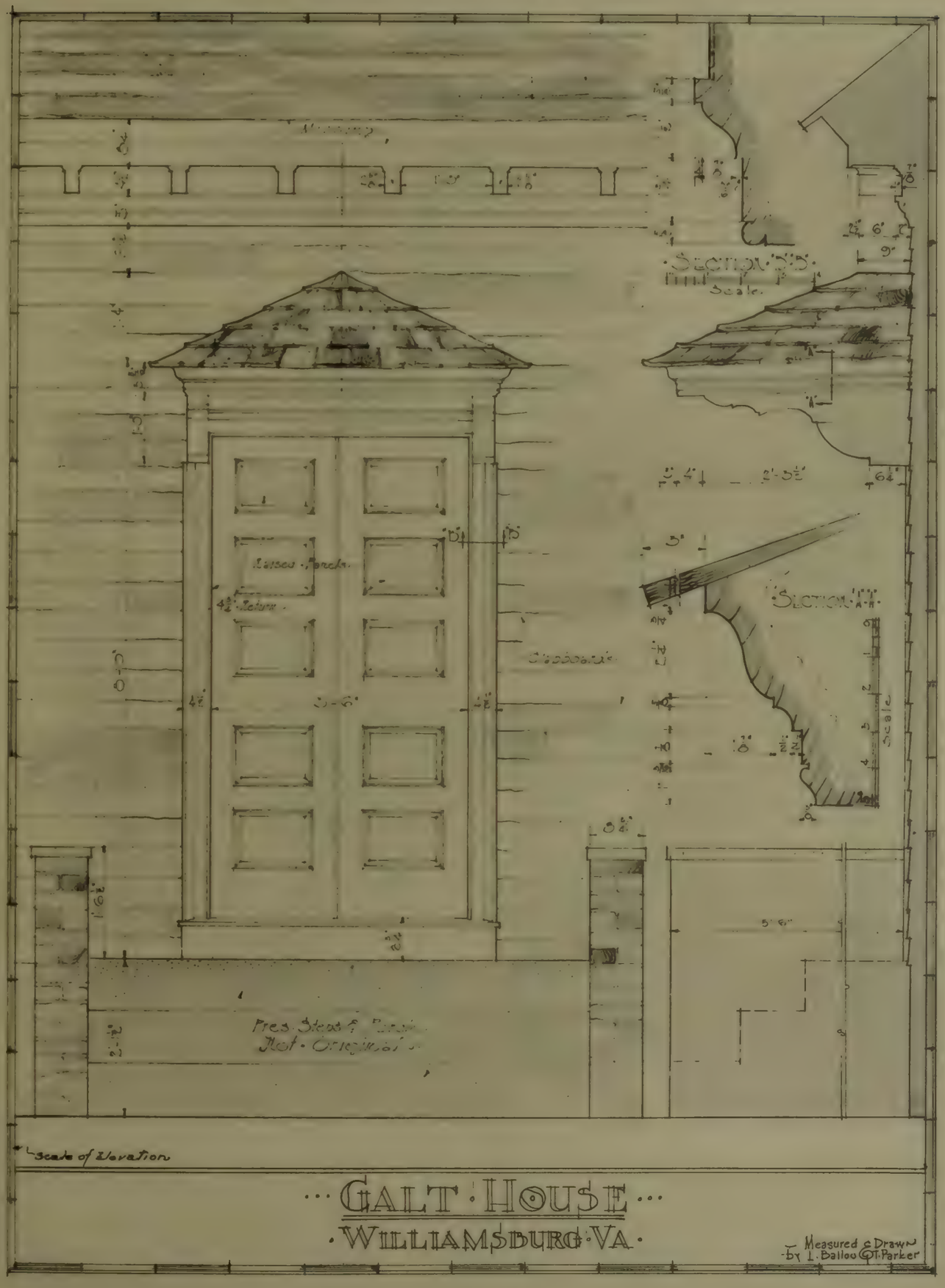
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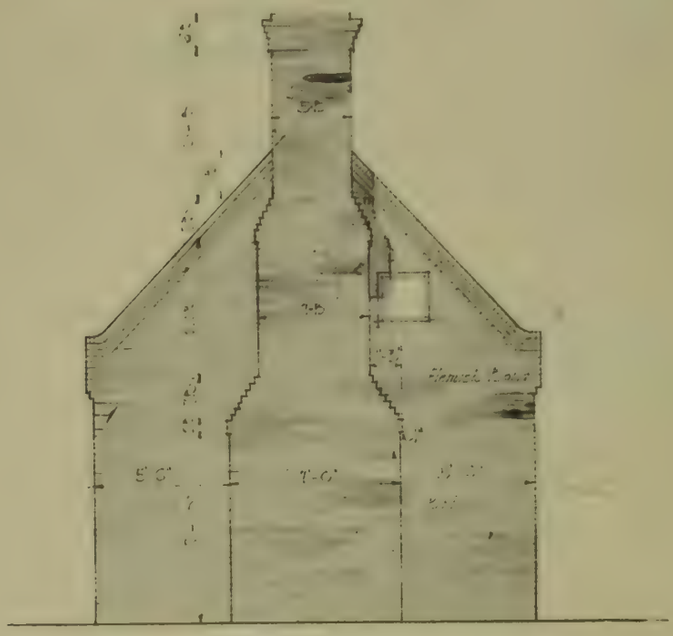


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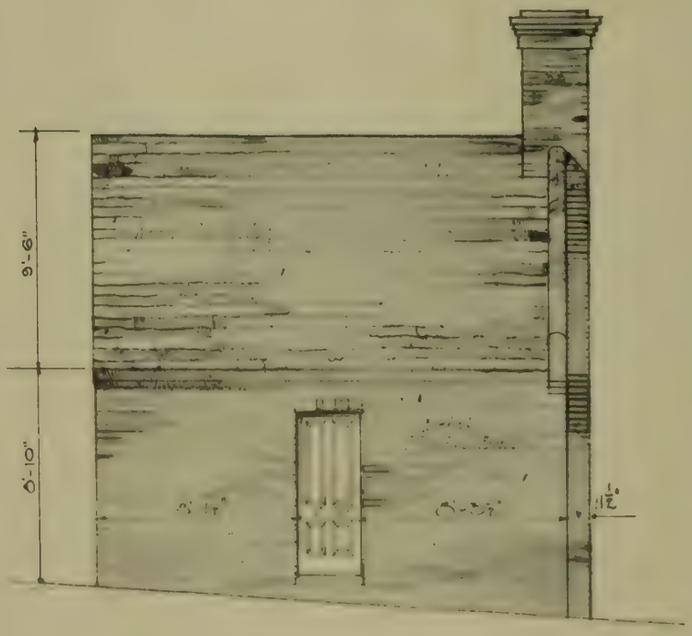


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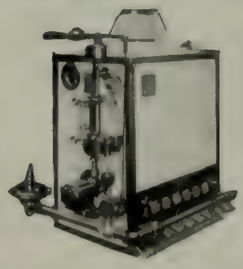
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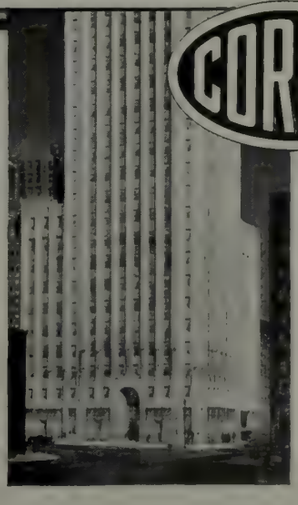
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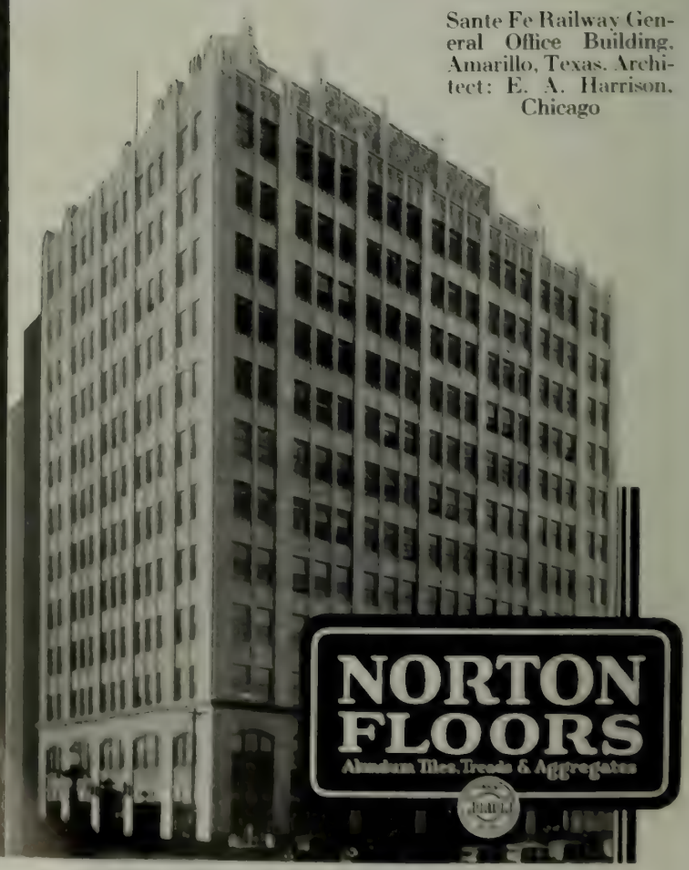


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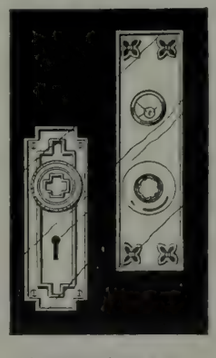
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5 *Kohler metal fittings* are engineered for efficiency . . . heavily plated with chromium, nickel or gold. They match the fixtures in style, character and quality.

6 *Materials* are the finest—*manufacture* is most particular. All Kohler products show craftsmanship and care.

7 This company *pioneered* many of the big advances in plumbing. This year's Kohler products are next year's new ideas.

8 Kohler quality extends to the *kitchen and laundry*—for every plumbing need.

9 Kohler quality *costs no more* . . . and saves money later.

10 Kohler fixtures and fittings are handled and installed by qualified plumbers.

11 Back of the Kohler trade-marks are the traditions and spirit of *an entire community* . . . beautiful Kohler Village.

HOME HUNTERS these days are asking to see the bathroom first. They are looking for color, for good design, for modern convenience. They know that only fine plumbing fixtures and fittings can ever be good enough. And they know the meaning of the Kohler mark—in terms of beauty, efficiency, safety and permanence.

One builder stated that the Kohler installation he put in helped sell out his operation more than any other single feature of the job. Others are equally emphatic in giving special credit to Kohler colors and Kohler quality. Architects have found that all-Kohler bathrooms and kitchens have a charm all their own—a precision that adds years of perfect service.

Read the eleven important points about plumbing and figure for yourself how much Kohler fittings can add to the living comfort, the convenience, and the economy of the houses you plan. Specifications for all-Kohler installations please all concerned—builder, tenant, and owner. . . . Remember that Kohler fixtures deserve Kohler fittings. Kohler Co. *Founded* 1873. Kohler, Wis.—*Shipping Point*, Sheboygan, Wis. —*Branches in principal cities*. . . . Look for the Kohler mark on each fixture and fitting.

KOHLER OF KOHLER

PLUMBING FIXTURES

THE COAT OF METAL PROTECTION



Study the COST FIGURES for priming and back-priming this house with Aluminum Paint

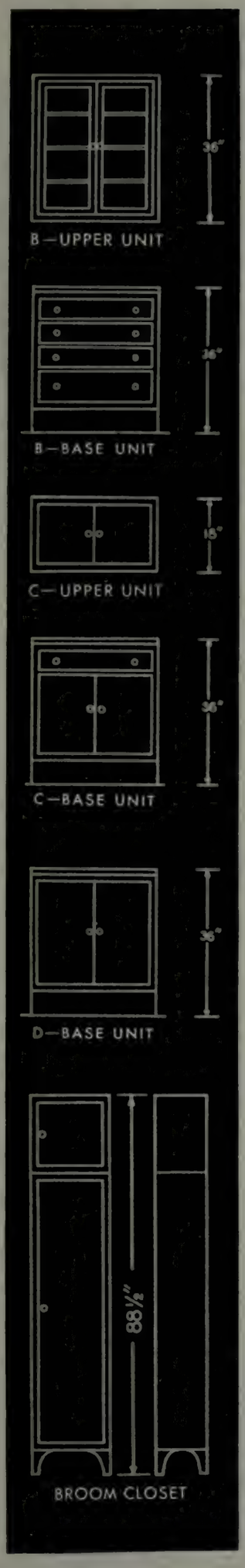
HOW does the cost of priming with aluminum paint compare with "lead and oil" priming? How much does "back-priming" add to the cost? The best way to answer these questions is to give comparative figures on a specific house.

The original estimate for painting the 10 room colonial house shown above, including interior and exterior knot sealing with shellac, priming *without back-priming*, with lead and oil and two finish coats was $1225.80. At the owner's request the specifications were altered to—Aluminum paint made with Alcoa Albron Powder and a suitable vehicle for priming *both front and back* of lumber. Knot sealing was of course unnecessary. The new figure, including the two finish coats, was $1300—only $74.20 extra for an infinitely better job. Moisture seeps into wood from both sides—priming and back-priming with aluminum paint checks moisture penetration. And as these figures prove, it adds very little to the expense of painting.

Aluminum Company of America does not sell paint. But aluminum paint made with satisfactory vehicles and Alcoa Albron Powder can be purchased from most reputable paint manufacturers, jobbers and dealers. Be sure the pigment portion is Alcoa Albron and is so designated. Let us send you the booklets, "Aluminum Paint, the Coat of Metal Protection" and "Specifications for Aluminum Paint". Address ALUMINUM COMPANY *of* AMERICA; 2467 Oliver Building, PITTSBURGH, PA.

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Olean Quality Metal Cabinets Olean N. Y.

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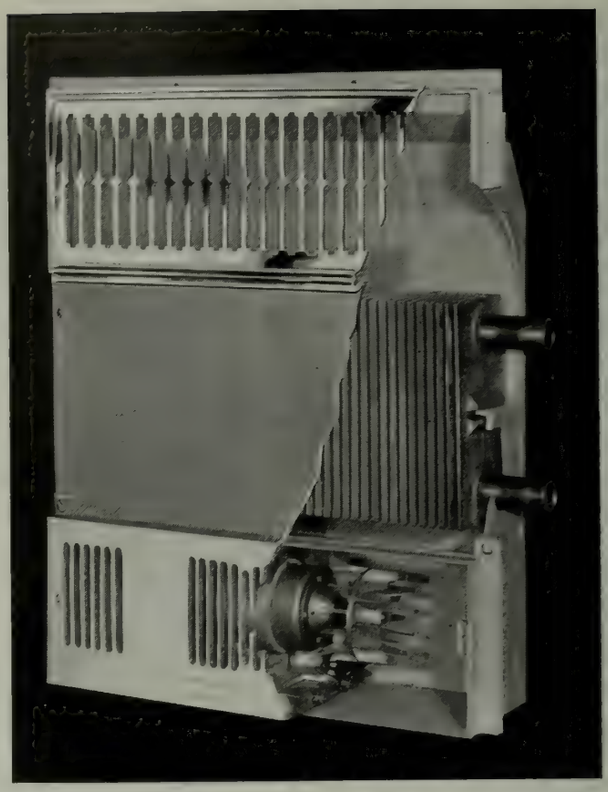
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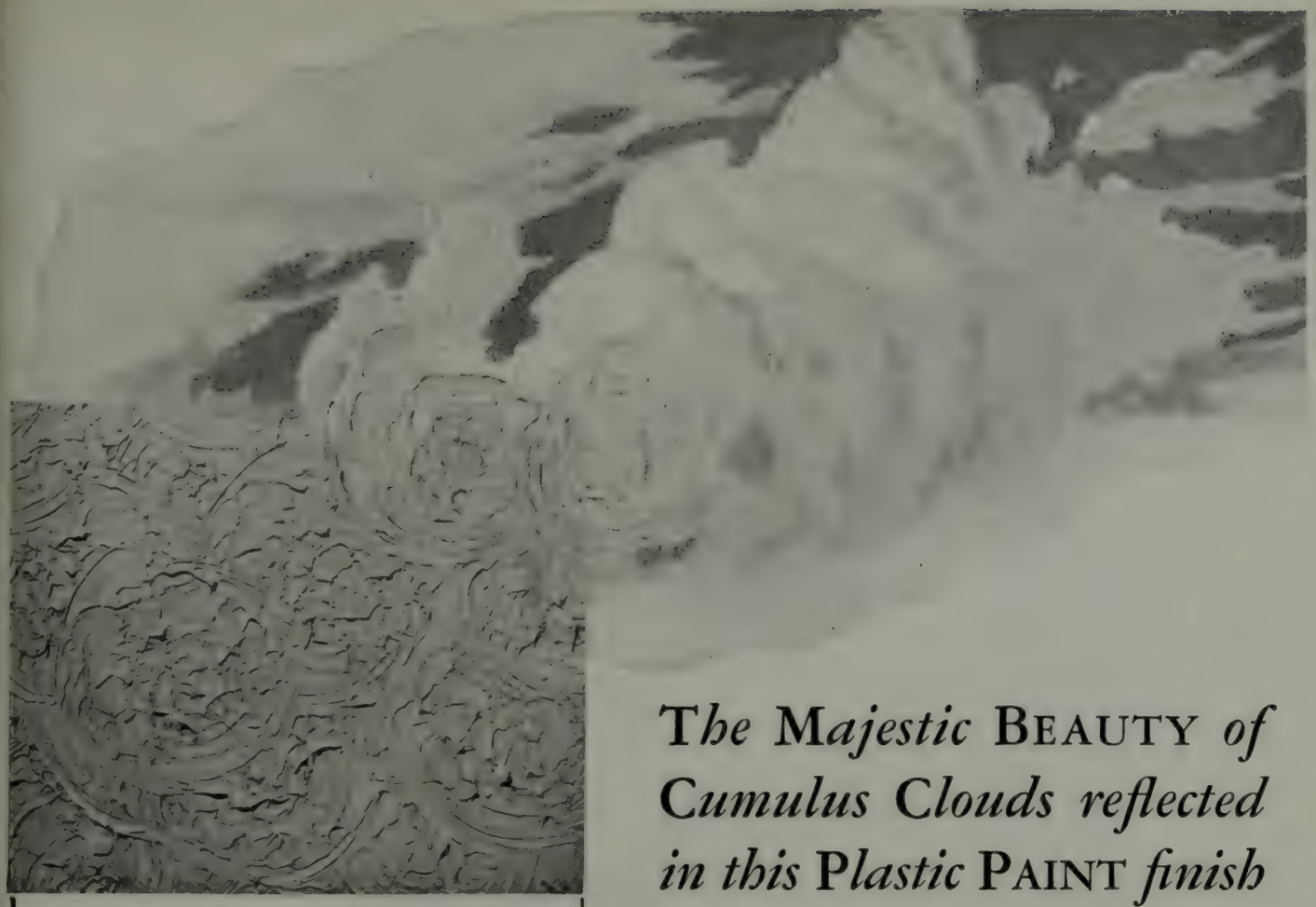
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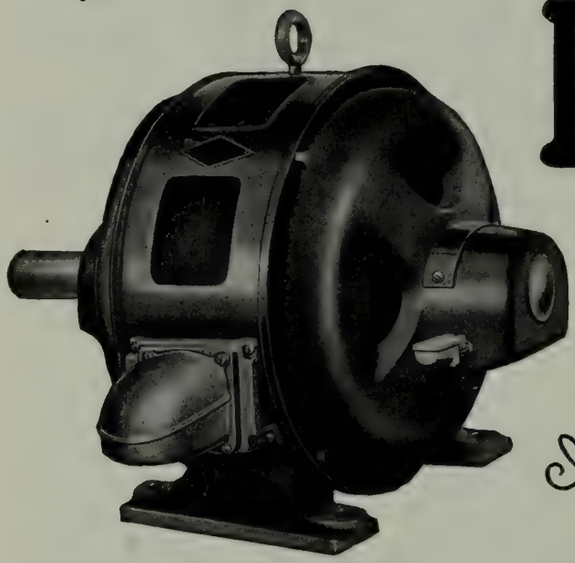
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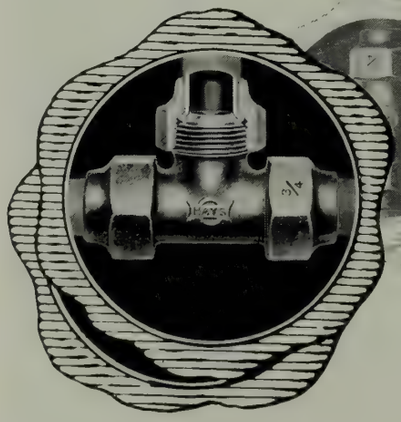
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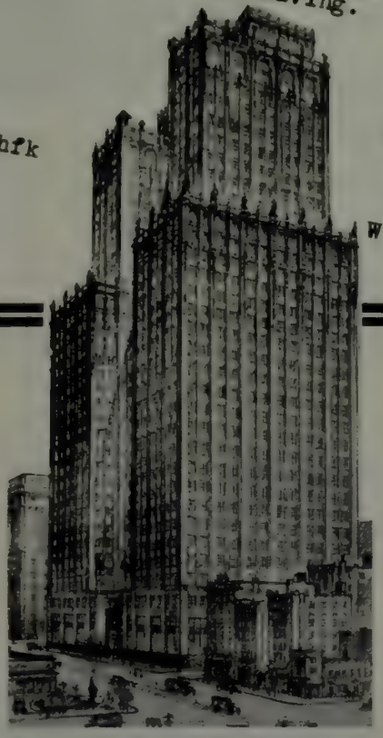
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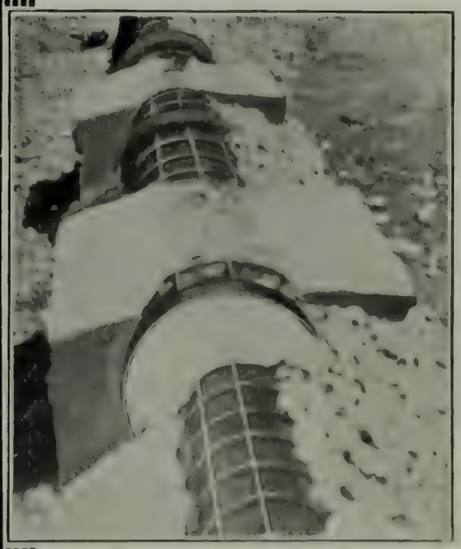
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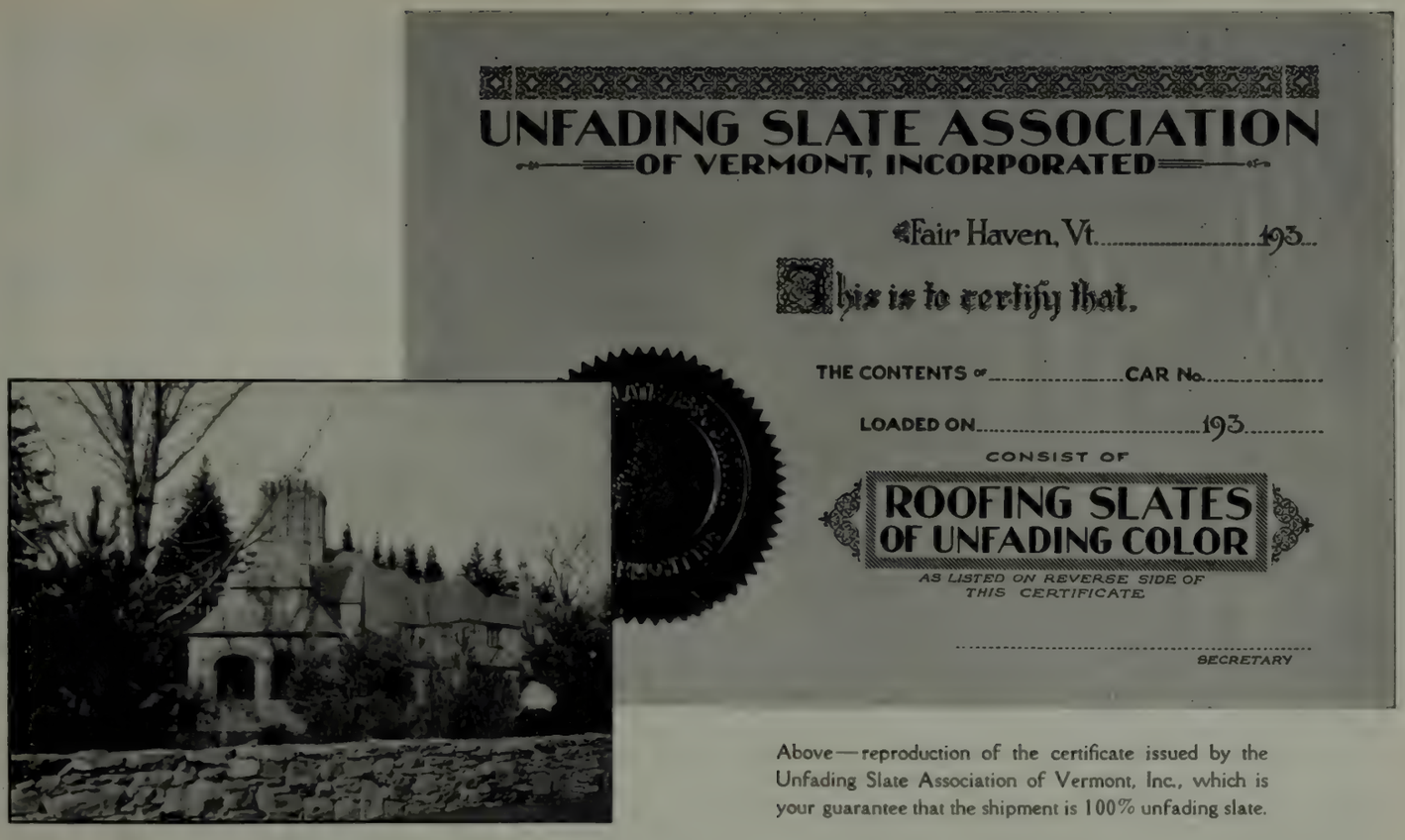
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And matching the proved quality of Youngstown pipe is Youngstown service, which is yours for the asking. When you are confronted with any problem involving the use of pipe, you will find the experienced steel counsellors of the Youngstown Sheet and Tube Company willing and anxious to serve you. A call to any of the twenty district sales offices listed below will bring you this service without obligation.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

One of the oldest manufacturers of copper-steel, under the well-known and established trade name "Copperoid"
General Offices—YOUNGSTOWN, OHIO



275 tons of Youngstown pipe are used in the plumbing system of the Western Union Telegraph Building in New York City.
Architects—**VOORHEES, GMELIN & WALKER**
Plumbing Engineer—**MEYER, STRONG & JONES**
Builder—**MARC EIDLITZ & SON**
Plumbing Contractor—**GEO. E. GIBSON CO.**

DISTRICT SALES OFFICES

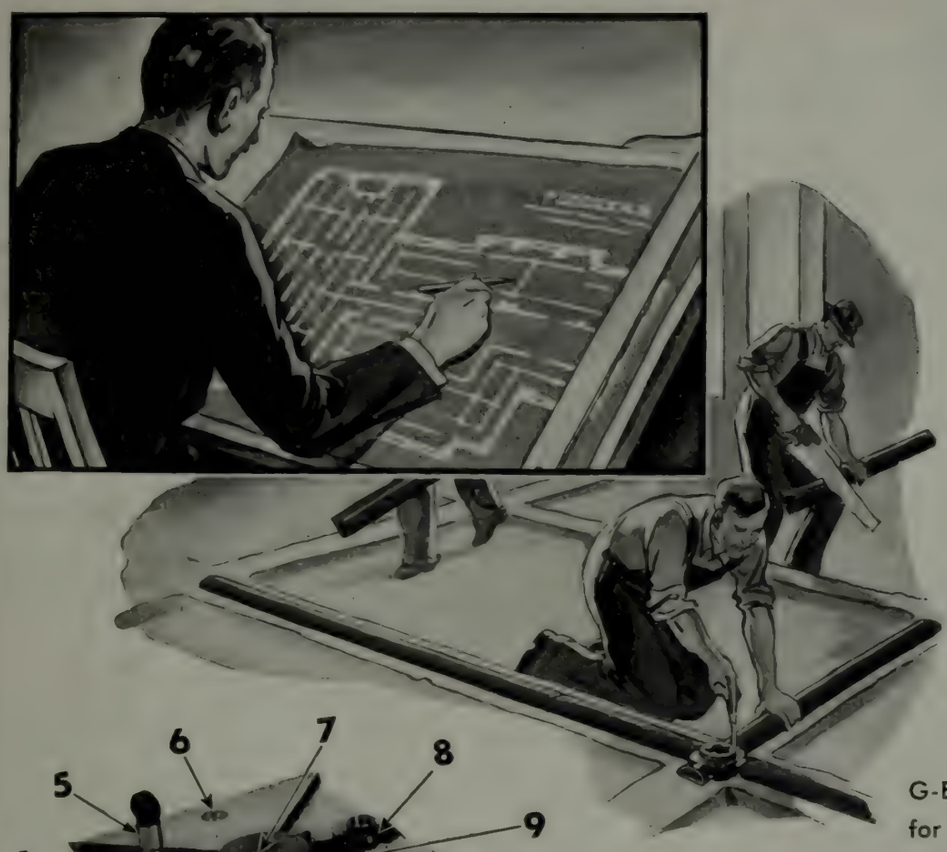
ATLANTA—Healy Bldg.
BOSTON—80 Federal Street
BUFFALO—Liberty Bank Bldg.
CHICAGO—Conway Bldg.
CINCINNATI—Union Trust Bldg.
CLEVELAND—Terminal Tower Bldg.
DALLAS—Magnolia Bldg.
DENVER—Continental Oil Bldg.
DETROIT—Fisher Bldg
KANSAS CITY, MO.—Commerce Bldg.
MEMPHIS—P. O. Box 462
MINNEAPOLIS—Andrus Bldg.
NEW ORLEANS—Hibernia Bldg.
NEW YORK—30 Church St.
PITTSBURGH—Oliver Bldg.
PHILADELPHIA—Franklin Trust Bldg.
SAN FRANCISCO—55 New Montgomery St.
SEATTLE—Central Bldg.
ST. LOUIS—525 Louderman Building
YOUNGSTOWN—Stambaugh Bldg.

LONDON REPRESENTATIVE
The Youngstown Sheet Products Co.
Dashwood House, Old Broad St.,
London, E. C. England

YOUNGSTOWN

GALVANIZED SHEETS PROTECT ∴ ∴ ∴ ∴ ∴ SAVE WITH STEEL

G-E FIBERDUCT



Makes Wiring Simple to Plan and Install



CUTAWAY MODEL G-E FIBERDUCT AND FITTINGS

1. G-E Fiberduct.
2. Coupling-support with leveling screws.
3. Oval crown 1 in. below surface molds strong concrete arch.
4. Brass floor flange flush with linoleum.
5. Lighting outlet, brass standpipe, bakelite head.
6. Brass insert; grouted—can't pull out.
7. Adjustable-height cover recessed for linoleum.
8. Brass insert threads into duct.
9. Heavy one-piece iron junction box with leveling screws.
10. Conduit for feeder lines.

G-E Fiberduct—the modern raceway for underfloor wiring in concrete—aids both architect and electrical contractor.

The architect can specify outlets *exactly* where he wants them . . . additional ones can go in practically *anywhere, any time,* quickly, economically. Thus he provides wiring adequate for today *and the future.*

Contractor's men find installation of G-E Fiberduct simple. It cuts with a wood saw . . . joins with clamps . . . levels readily with screws. Wire pulls in easily. Brass fittings adjustable for height and surface neatness.

G-E Fiberduct is non-corrodible...made for the life of the building. Deliveries from G-E Distributors' stocks are prompt everywhere.

For further information, please write Section C-156, Merchandise Dept., General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

▲ FIBERDUCT AN ELEMENT OF THE G-E WIRING SYSTEM ▲

MERCHANDISE DEPARTMENT GENERAL ELECTRIC COMPANY BRIDGEPORT, CONNECTICUT



NEW

Instantly sells itself to every coal-fired warm air furnace owner... profitable too!

HERE'S a simple, easily installed Furnace Thermostat that ends forever the annoyance of regulating draft and check dampers . . . that ends the nightly task of "banking" furnace fires; that keeps the whole house uniformly warm!

Made by Robertshaw . . . leading manufacturer of thermostatic devices. It's accurate. It's foolproof. It's an improvement on any similar furnace heat control ever presented. And priced so low that every furnace owner can afford one . . . yet it brings the dealer a handsome profit!

For the first time, automatic control of the furnace temperature is secured by a *gradual* opening and closing of the dampers.

ECONOMICAL The new Robertshaw Furnace Thermostat saves at least 20% of the average annual fuel bill. It keeps the fire constantly at just the temperature you wish. It makes the sudden flare-up of heat and subsequent cooling-off impossible. It evenly regulates burning so as to consume every atom of energy in the fuel!

That's only one saving. Robertshaw's new Furnace Thermostat reduces furnace depreciation; keeps repair costs down. The single overheating sufficient to ruin any furnace is impossible with the Robertshaw Furnace Thermostat in operation! Cracked fire chambers and burned casings are avoided, too, thus prolonging indefinitely the life of the furnace.

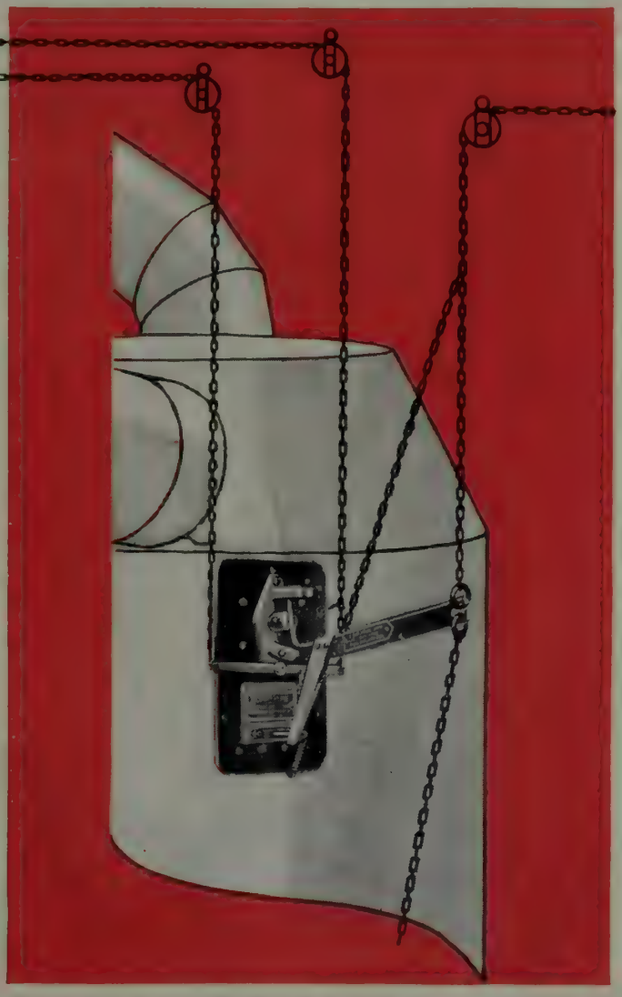
Being *non-electrical,* the installation of the Robertshaw Furnace Thermostat is simple and does not require the expensive services of an electrician.

A TRUE SAFEGUARD Now . . with the Robertshaw Furnace Thermostat installed . . the householder can leave his home at any time, in full security. He knows that with the Furnace Thermostat adjusted, dangerous overheating is

ROBERTSHAW THERMOSTAT COMPANY · *Youngwood, Pa.*

ROBERTSHAW FURNACE THERMOSTAT

$35.00 complete ready to install



impossible. He knows that if the Furnace Thermostat fails to operate, the drafts will automatically *close*. He knows that his flues are safe from fire hazard.

At night, "banking" is unnecessary. Put in an abundance of fuel . . enough to last overnight. Set the Furnace Thermostat and go to bed. Nothing more is necessary. The fire will burn slowly, evenly, all night long. Wake up to a comfortable temperature in the morning and if you want it warmer turn the Furnace Thermostat instantly the fire warms up to just the temperature you want keeps burning exactly even as long as the fuel lasts!

WRITE FOR DETAILS Address a post-card to Robertshaw for further information. Learn how this great New Furnace Thermostat can make you more friends and longer, quicker, more satisfactory profits!

Western Electric Uses 1,196,000 Sq. Ft. of Gypsteel Pre-Cast Roofs



Some of the buildings of the Western Electric Co. constructed with the Gypsteel Pre-Cast Roof System.

WESTERN ELECTRIC
Approves Gypsteel Pre-Cast Roofs both in tests and actual use of 1,196,000 Sq. Ft.

WHEN Western Electric Company Engineers were first told about the advantages of Gypsteel Pre-Cast Roofs for factory buildings six years ago, they insisted upon making tests of this material.

These tests were made. They were satisfied as to its strength, fire resistance, durability, etc. Results and cost comparisons with other kinds of roofs were satisfactory, and this great industrial leader placed its initial order with us.

This has since been followed by others, the complete record being 1,196,000 square feet of Gypsteel Pre-Cast Roofs covered by 14 contracts, for Western Electric buildings at Kearny, N. J., Hawthorne, Ill., New Haven, Conn., and Baltimore, Md. Enough to cover over 29 city blocks 200′ square.

Actual experience since 1924 with Gypsteel Pre-Cast Roofs has borne out the tests Western Electric made then, and shown beyond doubt the numerous savings and advantages secured through the use of Gypsteel Pre-Cast Roofs.

The whys and wherefores are all explained in our Roof Catalog. May we send it to you?

GYPSTEEL

Pre-Cast Long Span and Short Span Roofs are made only by this Corporation

General Offices: Linden, N. J.

STRUCTURAL GYPSUM CORPORATION

Sales Offices in Principal Cities



SUBJECT TO HIS APPROVAL

Time—That Tough Old Tester of everything in this world—writes the final "Okay" on the materials that make up any structure.

For Time alone can tell whether those materials are worthy—serving faithfully through the years, or causing trouble and expense long before completing their expected life-span.

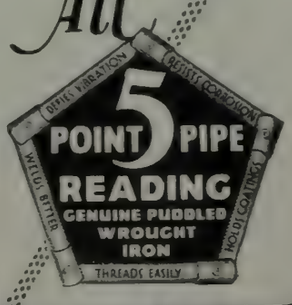
In the important matter of piping, so vital to permanence, Time has spoken clearly. His verdict—today as eighty years ago—is Genuine Puddled Wrought Iron for lasting pipe economy and satisfaction. No other pipe material has proved so successful in withstanding all the attacks of Time and his destructive henchmen—corrosion, vibration, leaky joints and the rest.

Use only Reading 5-Point Nipples with Reading 5-Point Pipe—you'll know them by the indented spiral band

Reading 5-Point Pipe is made of Genuine Puddled Wrought Iron, that rust-resisting, strain-defying metal of the ages. That is why you can specify Reading 5-Point Pipe with the confidence that it will outlast ordinary pipe two to one, and probably five to one!

READING IRON COMPANY, Reading, Pennsylvania

For Your Protection, This Indented Spiral Forever Marks All



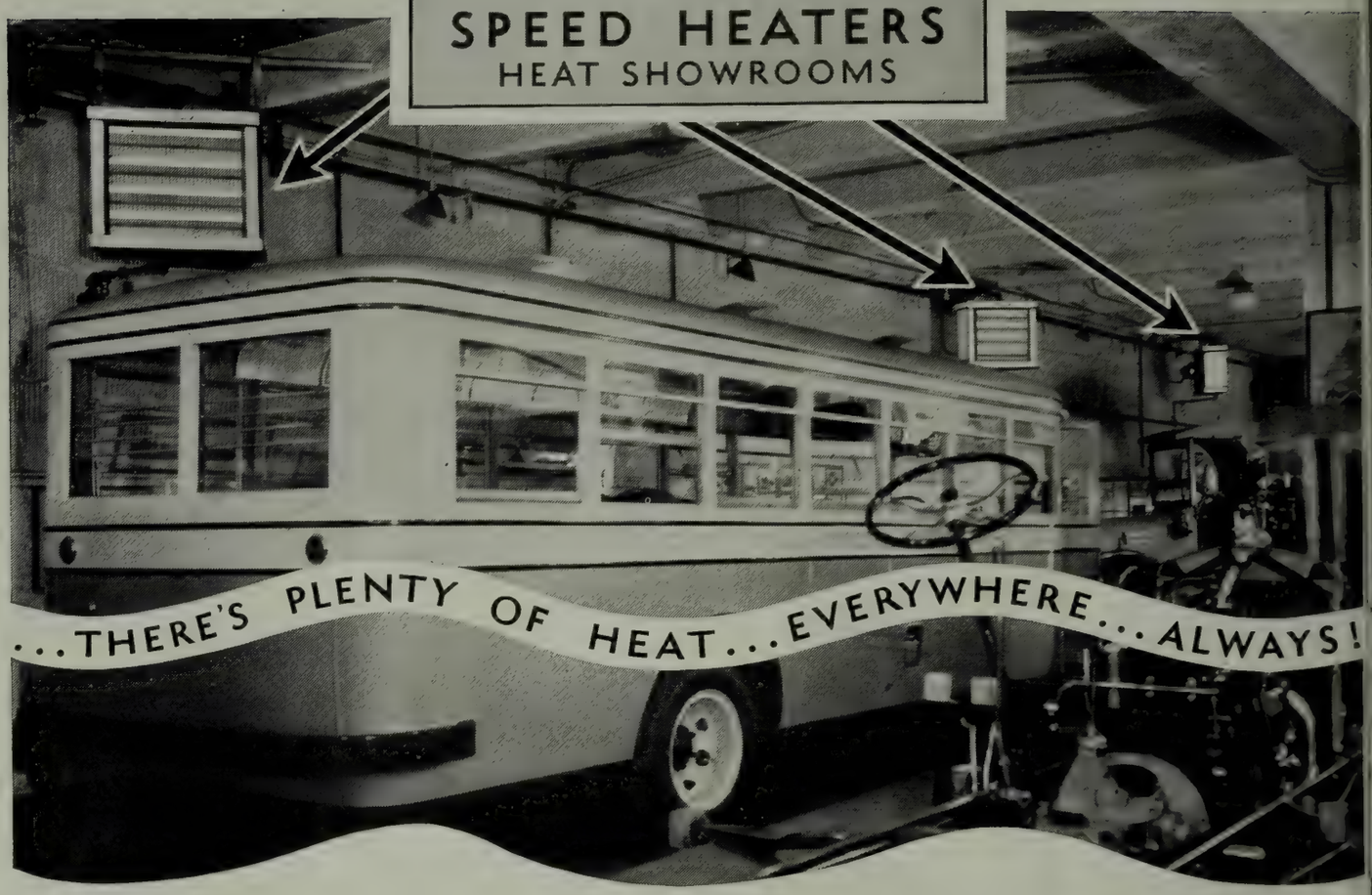


GENUINE PUDDLED WROUGHT IRON
READING PIPE
DIAMETERS RANGING FROM ⅛ TO 20 INCHES



Science and Invention Have Never Found a Satisfactory Substitute for Genuine Puddled Wrought Iron

WHEN SPEED HEATERS HEAT SHOWROOMS

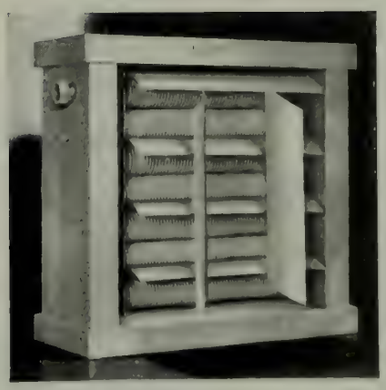


Showroom of Mack Trucks, Inc., 440 Lexington Avenue, N. Y. C. Equipped with Sturtevant Speed Heaters.

THAT'S the beauty of Speed Heaters! Heat in abundance ... *thoroughly distributed!*

No job is too tough for them. Ceilings may be 30 feet high... floor area as large as a farm... and swept by drafts. But Speed Heaters will kill the cold... get heat to where it's needed... efficiently... with speed!

Showrooms, auditoriums, large stores, factories, warehouses, garages, gymnasiums and other large areas... all are now being heated by Speed Heaters instead of by ordinary radiators. For Speed Heaters mean better heating... and a worth while saving of steam in the bargain.



Why not get all the interesting facts about this equipment *now?* Send for these two bulletins: (1) The Speed Heater... A short talk on a radically new development in heating apparatus; (2) Complete Data on Speed Heaters for architects.

B. F. STURTEVANT COMPANY

Plants and Offices at: Berkeley, Cal • Camden, N. J. • Framingham, Mass. Galt, Ontario • Hyde Park, Mass. • Sturtevant, Wis.

Branch Offices: Atlanta, Baltimore, Boston, Buffalo, Camden, Charlotte, Chicago, Cincinnati, Cleveland, Dallas; Denver, Detroit, Hartford, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, Newark, New York; Omaha, Pittsburgh, Portland, Me.; Portland, Ore., Rochester, St. Louis, San Francisco, Seattle, Washington, D. C. *Canadian Offices:* Toronto, Montreal, Galt. *Canadian Repr.:* Kipp Kelly, Ltd., Winnipeg. *Agents in Foreign Countries*

Sturtevant (REG. U. S. PAT. OFF.) **SPEED HEATERS**

FEDERAL SEABOARD TERRA COTTA



Convention Hall at Asbury Park
New Jersey

Architect — Warren & Wetmore

General Contractor
Turner Construction Co.

Terra Cotta — Federal Seaboard
Terra Cotta Corp.



NO other material but Terra Cotta could give the permanent sparkling color effects demanded by the design of this building . . . Buff multi-chrome Terra Cotta, large scale pieces, bright polychrome, shaded ornamentation including fire gilt provide the outstanding decorative features of this new gigantic Convention Hall.

FEDERAL SEABOARD TERRA COTTA CORPORATION

ARCHITECTURAL
TERRA COTTA
MANUFACTURERS

F S T C

OFFICES
10 EAST 40th STREET
NEW YORK CITY
TELEPHONE ASHLAND 1220

FACTORIES: PERTH AMBOY, N. J. • WOODBRIDGE, N. J. • SOUTH AMBOY, N. J.

KNIGHT-WARE

in the

Chemistry Building



Chemistry Buildings at these institutions are equipped with KNIGHT-WARE

PRINCETON UNIVERSITY
COLUMBIA UNIVERSITY
WEST VIRGINIA UNIVERSITY
OHIO STATE UNIVERSITY
JOHNS HOPKINS UNIVERSITY
NEW YORK UNIVERSITY
WASHINGTON UNIVERSITY
DUKE UNIVERSITY
PURDUE UNIVERSITY
PENN STATE COLLEGE
LAFAYETTE COLLEGE
BATTELLE MEMORIAL
McGILL UNIVERSITY

Specify
KNIGHT-WARE
Waste and Drain Lines
Ventilating Ducts
Laboratory Sinks
Sumps and Catch Basins
Ventilating Flue Caps

If the following facts interest you—

KNIGHT-WARE costs less than most acid proof materials. Your initial cost is your LAST cost.

KNIGHT-WARE is easily and economically installed. Waste and Ventilating Pipe and Fittings are hung in much the same manner as ordinary materials. Joints are easily packed and result in permanent leak and acid proof connections.

Positively unaffected by acids, alkalies, chemicals or corrosive solutions and gases and highly resistant to abrasion, there is no wear-out in KNIGHT-WARE. *It lasts the life of the building.*

Consult us.

MAURICE A. KNIGHT

OFFICE AND PLANT
AKRON, OHIO

New York City
804 World Building

Philadelphia
1600 Arch Street

San Francisco
Merchants Exchange Building

Niagara Falls
309 United Office Building

Montreal, Que.
1307 Notre Dame Street, West

ZENITHERM

FLOORINGS in beautiful HADDON HALL



RANKIN & KELLOGG,
Architects,
Philadelphia, Penna.

CHAPMAN DECORATIVE CO.
Interior Decorators,
Philadelphia, Penna.



HADDON HALL recently spent six million dollars in completely modernizing this famous Boardwalk Hotel at Atlantic City. The idea was a complete expression of modern day beauty and comfort for their guests!

Zenitherm flooring, which "looks and wears like marble, yet is worked like wood," was chosen for the corridors, the four dining rooms, the Chinese Mandarin Room, the West Room, the Barber Shop, and the Sun Room—*all* decorated in *different* designs, thus emphasizing the adaptability of Zenitherm's twenty-one color tones to *any* decorative scheme. Indeed, the Zenitherm flooring in the Sun Room was worked out to represent the six Wampum belts that were given in trade when William Penn purchased Pennsylvania from the Indians.

Zenitherm offers a permanent investment in good appearance—for floors, walls, terraces,—in homes and offices, as well as clubs, hotels, and public buildings. When used for exteriors, it actually toughens under the elements. See Sweet's Catalog B2286-7-8-9 for complete color chart and information on how to specify Zenitherm for use inside or outside, over wood, concrete, or brick.

ZENITHERM

For Walls and Floors

ZENITHERM COMPANY, Inc., KEARNY, NEW JERSEY
110 EAST 42nd STREET, NEW YORK, N. Y.

PHILADELPHIA CHICAGO BOSTON SAN FRANCISCO DETROIT

TE-PE-CO
in the School



Asheville High School and Junior College, Asheville, North Carolina
Architect—DOUGLAS D. ELLINGTON
Plumbing Contractors—PICKARD & Co., through Hajoca Corp.

THE "Universal" Closet has all the advantages of the wall-hung closet plus a simplified installation that requires no carrier. Its center of gravity is within itself. Full syphon jet construction with extended lip and a large vent passage from the bowl opening vertically into the pipe chamber.

The pipe corridor has long been popular in the planning of buildings where closets must be used in groups. The economy of this installation is obvious. With the "Universal" a quite narrow corridor is possible. Venting is accomplished at no cost. All supplies and wastes, being back of wall, permit use of rough material, a saving in both material and labor. The outlet being in the corridor also avoids the necessity of dropping or boxing the ceiling.

The fine syphon jet construction, large water surface, oversize trapway, and strong action make the Universal Closet ideal for all types of public building construction.



Detailed view of building from campus



Battery of Universal closets before setting partitions.



Universal closet as seen from room after finished installation.

THE TRENTON POTTERIES COMPANY
Trenton, New Jersey, U. S. A.

NATIONAL SHOWROOM
New York City, 101 Park Ave.
Entrance on 41st St.

BRANCH OFFICES
Boston, Philadelphia and
San Francisco

Export Office: 115 Broad Street, New York City

OUR GUARANTEE—We make but one grade of ware—the best that can be produced—and sell it at reasonable prices. We sell no seconds or culls. Our ware is guaranteed to be equal in quality and durability to any sanitary ware made in the world. The Te-pe-co trade-mark is found on all goods manufactured by us and is your guarantee that you have received that for which you have paid.

TE-PE-CO
ALL-CLAY PLUMBING FIXTURES

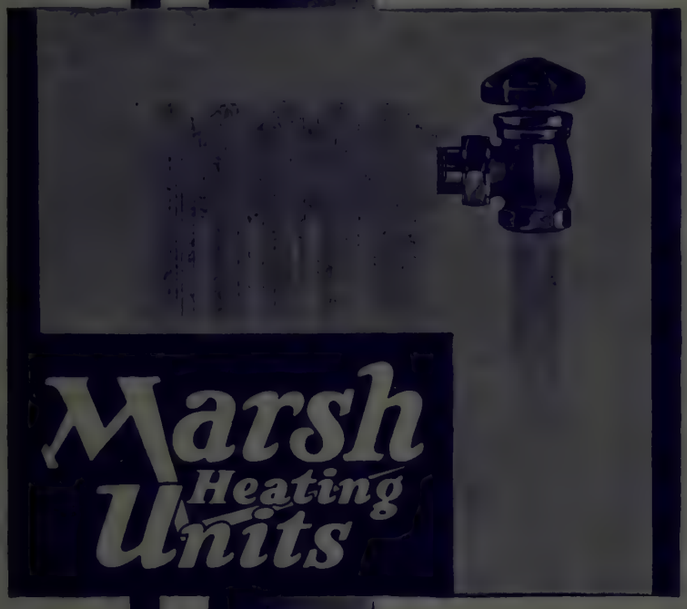
MARSH presents *truly modern heating*

One good example of outstanding Marsh engineering is this strikingly new radiator valve.

Modern lines now give distinction to this vital unit. The attractive design is beautifully set off by an enduring two-tone finish, polished surfaces being of lustrous chromium.

Crowning this latest achievement, is the ultra modern control wheel which combines hand fitting comfort with appealing design.

The beauty of Marsh products is more than skin deep. An x-ray of this new Marsh Product shows a modern development of interior design—exclusive with Marsh—with a smooth operating control and sturdy, enduring construction.



See the nearest Marsh representative for complete details of this valve.

Increased activity in rapidly expanding markets has made it necessary to increase the number of our representatives. Sales engineers experienced in these or similar lines are invited to write. If your territory is open, this may mean a valuable connection.

JAS. P. MARSH & CO.

(DIVISION OF COMMERCIAL INSTRUMENT CORPORATION)

Home Office: 2083 Southport Ave.
Chicago, Illinois

551 Fifth Ave., New York City — **2539 Pennsylvania Ave., N. W. Washington, D. C.**

Bendix Bldg., Los Angeles

Other offices in principal cities

CONNECTICUT

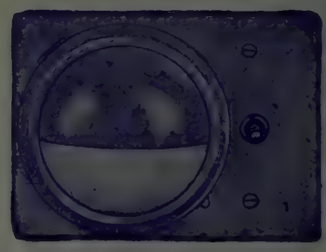
lights the way

In truly modern hotels, clubs, theatres, hospitals and homes, Connecticut Night Lights furnish safe, trouble-free, economical and attractive floor illumination.



Dome type night light without switch.

Connecticut Night Lights fit flush in the wall and spread their light effectively on the floor.



Dome type night light with switch.

Distinctive Connecticut construction eliminates maintenance costs . . . the Bulb replacement can be made by anyone and takes but a moment.

Operating costs are negligible with Connecticut Night Lights. Illumination is so effective that 10 or 15 watt bulbs give ample light.



Louvred night light—available for vertical or horizontal mounting

An engineering background of 36 years makes these distinctive lights possible. Truly, *Connecticut Lights the Way.*

CONNECTICUT TELEPHONE & ELECTRIC CORPORATION

(Division of Commercial Instrument Corporation)

54 BRITANNIA STREET — MERIDEN, CONNECTICUT

Connecticut Telephone & Electric Corp., 54 Britannia Street, Meriden, Connecticut
Gentlemen: Please send me latest literature describing night lights and other equipment in detail.

Name..... Address.....

City..... State.....



Residence
Oyster Bay, L. I.

Delano & Aldrich
Architects

MONSON LUSTRE ROOFING SLATE

The architect who is seeking the finest type of unfading black slate will find his requirements perfectly met in Monson Lustre: for this slate has no equal for strength, lasting quality, and beauty.

Monson Lustre is mined and shipped directly from our quarries to the job, and receives the same strict supervision and inspection as our other slate.

Since this beautiful black slate does not cost much more to quarry, and no more to lay than inferior slates, a truly high class roof may be specified without fear of seriously increasing the total cost of the building.

Rising-and-Nelson-Slate-Company

WEST PAWLET, VERMONT

Architects' Service Department: 101 Park Avenue, New York City

CHICAGO DETROIT PHILADELPHIA BOSTON

Judged on the basis
of appearance and permanence

EXTERIOR LIGHTING FIXTURES

by

SMYSER-ROYER

will meet every requirement

A·L·E·A



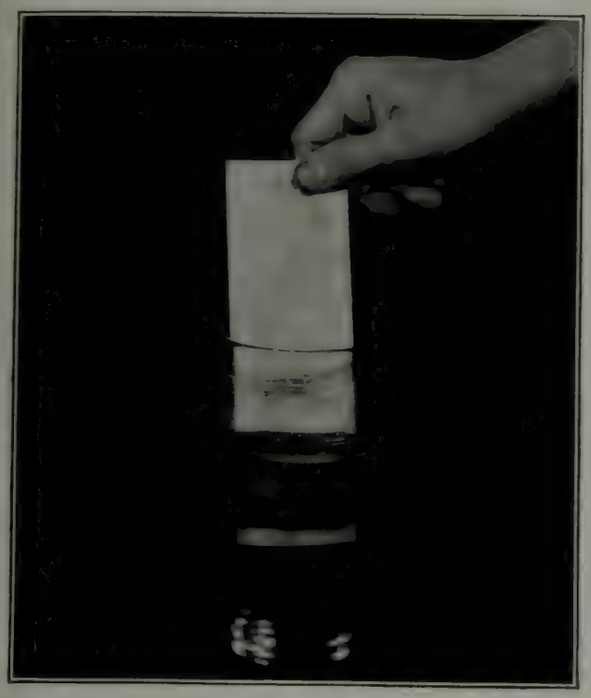
SINCE 1840 Smyser-Royer craftsmen have been supplying exterior lighting fixtures for America's foremost architects. Ninety years of experience in faithfully interpreting and executing the architect's plans has enabled the Smyser-Royer Company to produce fixtures that are perfect in every detail, yet as durable as the building itself.

If an original design is not needed, the Smyser-Royer Catalogue will reveal a wide selection of artistic designs, created by craftsmen to meet all the needs of modern lighting.

In Sweet's Catalogue, Section D, pages 5534 to 5544, two hundred Smyser-Royer fixtures for every period and purpose are illustrated.

SMYSER-ROYER COMPANY, *Main Office and Works,* York, Pa.

Philadelphia Office, 1700 WALNUT STREET



Try this test

TAKE a glass of diluted sulphuric acid (two parts water, one part acid). Place a strip of the best galvanized roofing in this solution. *Let it stay there five minutes.* Note how quickly the acid eats away the coating. In every smoky locality sulphuric acid is slowly but surely eating away the roofing. Soot forms on the roof, rain water mixes with it to form acids which stain and corrode even copper.

—then—

Try this one

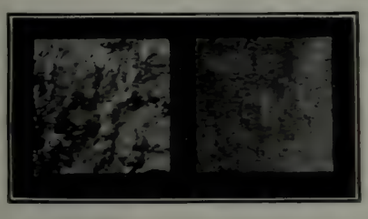
PLACE a strip of LEADCLAD in the same solution as above. *Let it stay there twenty-five minutes or longer* and notice that the PURE LEAD coating has not been harmed. That explains why LEADCLAD lasts years longer. The natural acids formed by rain and smoke neither corrode nor stain it. Its copper bearing steel base is rust resisting... its PURE LEAD coating is rustproof.

There is a LEADCLAD product for every roofing need. It is made in all standard forms with a complete line of drainage products.



Wheeling Metal & Mfg. Company

WHEELING, WEST VIRGINIA



LEADCLAD COPPER

Here is an all time roofing material. It has a base of pure copper to which is fused a thick coating of pure lead. Permanent, non-staining. Particularly recommended for flashings, gutters, leader heads, conductor pipe and all drainage accessories. Made in two finishes, Old English or smooth, as illustrated.



See our Catalog in Sweets pages B1717-1728

A COMPLETE LINE OF GENUINE LEADCLAD AND APEX GALVANIZED ROOFING MATERIALS

LEADCLAD

MADE IN GLENDALE SINCE 1912

REG. U.S. PAT. OFF.

TILES SHINGLES CORRUGATED V CRIMP ROLL STANDING SEAM CONDUCTORS EAVESTROUGH VALLEYS

ALSO APEX HEAVY GALVANIZED

Leadclad Stocks in the Following Cities:

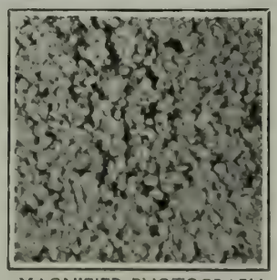
Boston, Mass.	Mansfield, Ohio	San Francisco, Calif.
Bridgeport, Conn.	Youngstown, Ohio	Portland, Oregon
New York City	Toledo, Ohio	Baltimore, Md.
Erie, Pa.	Detroit, Mich.	Norristown, Pa.
Cleveland, Ohio	Richmond, Va.	Tacoma, Wash.
Cincinnati, Ohio	Los Angeles, Calif.	Medford, Ore.

AN AKOUSTOLITH INSTALLATION



NEW ATHLETIC BUILDING
HARVARD UNIVERSITY
Cambridge, Mass.

Coolidge, Shepley, Bulfinch & Abbott
Architects



MAGNIFIED PHOTOGRAPH
OF PLASTER TEXTURE.
SHOWING POROSITY

THE ceiling over both pools is finished with AKOUSTOLITH Plaster, which eliminates excess reverberation and prevents ceiling condensation.

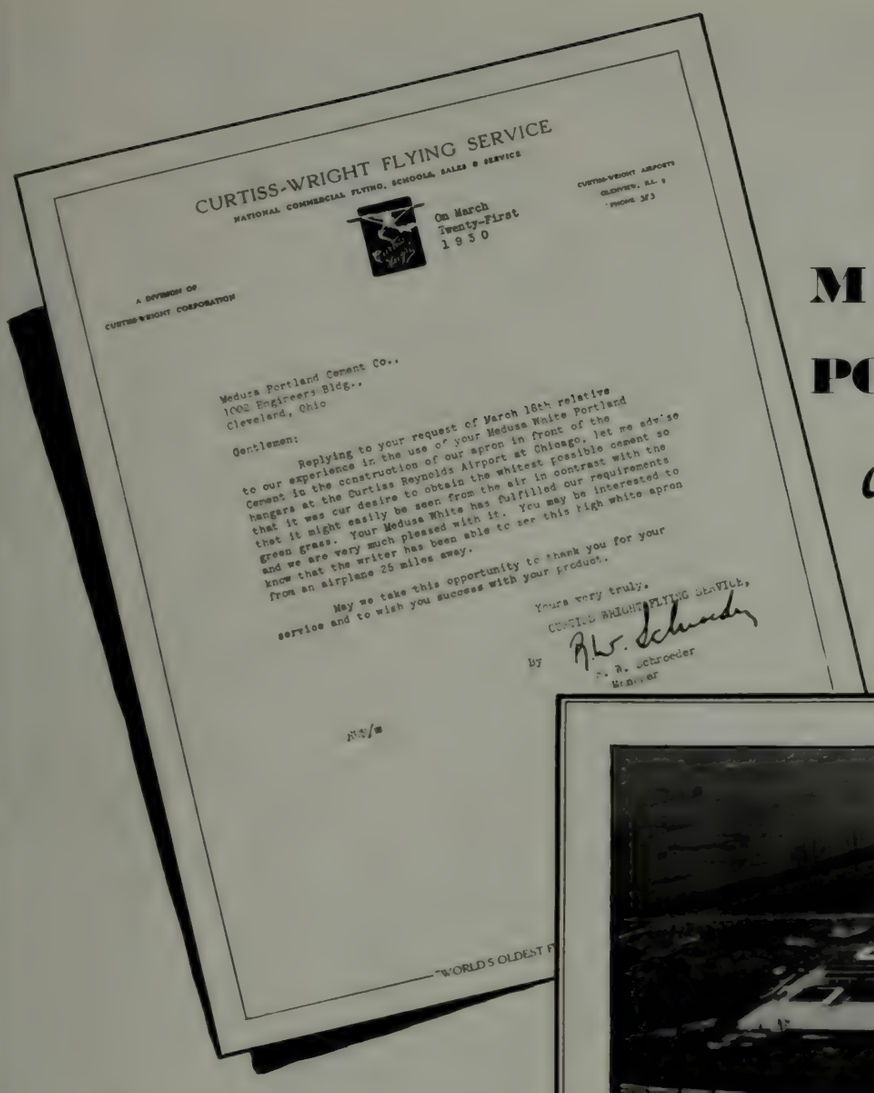
AKOUSTOLITH, available in either tile or plaster form, is the most efficient sound-absorbing masonry material and the ONLY material of high sound-absorbing efficiency which is fireproof and in no way injured by moisture.

Complete Catalogue in Sweet's.

R · Guastavino Company

40 COURT STREET, BOSTON, MASS. 225 WEST 34th STREET, NEW YORK, N. Y.

R. GUASTAVINO CO. OF CANADA, Ltd.—New Birks Building, Montreal, P. Q.



Hangar Apron of MEDUSA WHITE PORTLAND CEMENT *can be seen from the air 25 miles away*



Architect: A. N. Rebori, Chicago.

THE above letter and photograph tell of a new use for Medusa White Portland Cement. At the Curtiss Reynolds Airport, Chicago, Illinois, Medusa White was specified primarily because of the excellent visibility of the beautiful permanent white surface it gives.

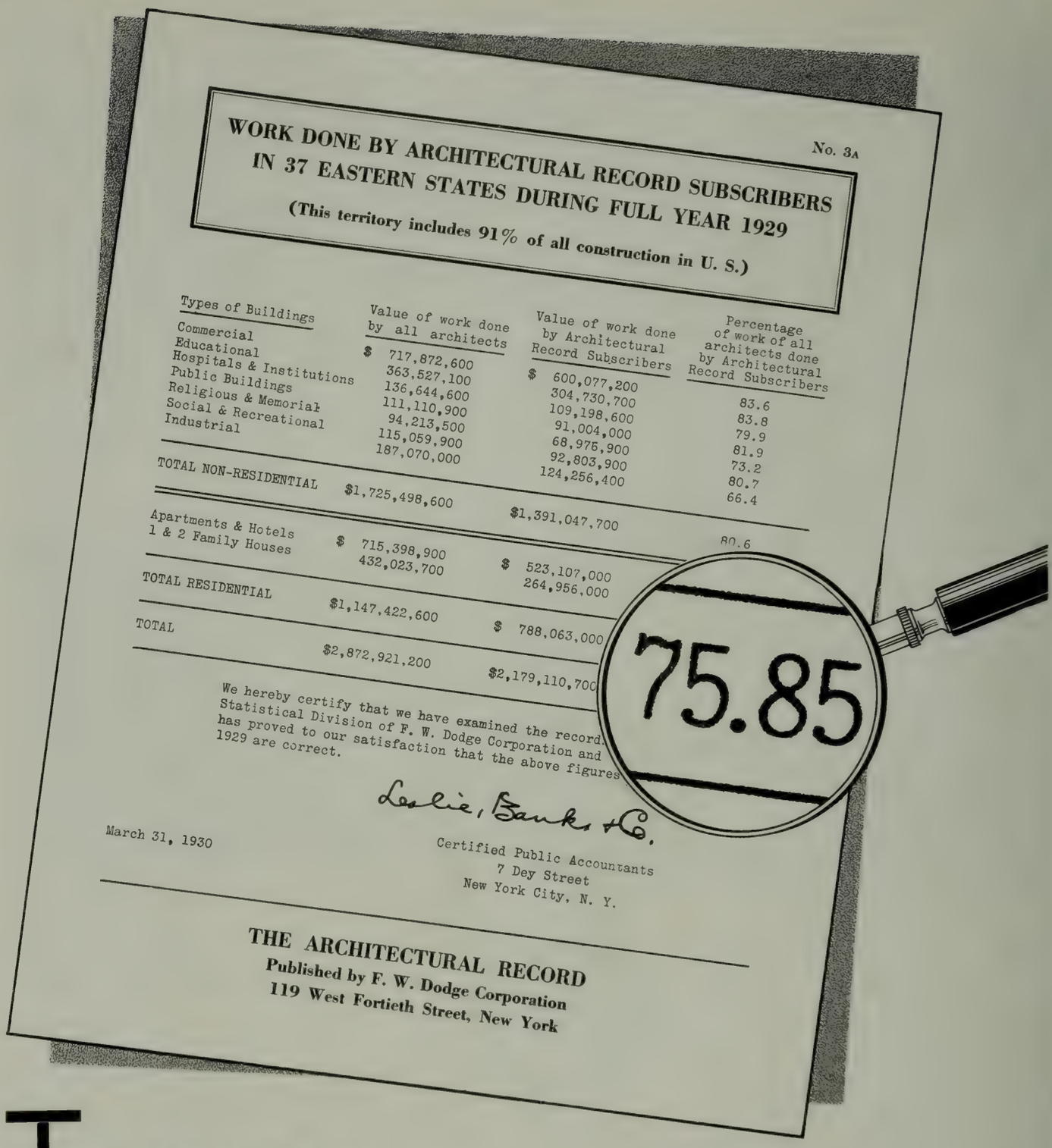
Whether you are designing an airplane hangar, public building or home, Medusa White, plain or waterproofed, will give you a distinctive, permanent and beautiful white finish that sets the construction apart as unusual and individual. Specify this cement for setting and backing up marble, granite and stone work, also for laying brick with non-staining mortar, white or tinted stucco.

Let us send you a copy of the Medusa White Portland Cement Book giving the many uses and specifications.

MEDUSA PORTLAND CEMENT COMPANY
1002 ENGINEERS BUILDING CLEVELAND, OHIO

Manufacturer of Medusa Gray Portland Cement (Plain and Waterproofed); Medusa Waterproofing (Powder or Paste); Medusa White Portland Cement (Plain and Waterproofed); Medusa Portland Cement Paint and Medusa-Mix, the Masonry Cement

MEDUSA



WORK DONE BY ARCHITECTURAL RECORD SUBSCRIBERS
IN 37 EASTERN STATES DURING FULL YEAR 1929

(This territory includes 91% of all construction in U. S.)

No. 3A

Types of Buildings	Value of work done by all architects	Value of work done by Architectural Record Subscribers	Percentage of work of all architects done by Architectural Record Subscribers
Commercial	$ 717,872,600	$ 600,077,200	83.6
Educational	363,527,100	304,730,700	83.8
Hospitals & Institutions	136,644,600	109,198,600	79.9
Public Buildings	111,110,900	91,004,000	81.9
Religious & Memorial	94,213,500	68,975,900	73.2
Social & Recreational	115,059,900	92,803,900	80.7
Industrial	187,070,000	124,256,400	66.4
TOTAL NON-RESIDENTIAL	$1,725,498,600	$1,391,047,700	
Apartments & Hotels	$ 715,398,900	$ 523,107,000	80.6
1 & 2 Family Houses	432,023,700	264,956,000	
TOTAL RESIDENTIAL	$1,147,422,600	$ 788,063,000	
TOTAL	$2,872,921,200	$2,179,110,700	

We hereby certify that we have examined the record
Statistical Division of F. W. Dodge Corporation and
has proved to our satisfaction that the above figures
1929 are correct.

Leslie, Banks & Co.

March 31, 1930

Certified Public Accountants
7 Dey Street
New York City, N. Y.

THE ARCHITECTURAL RECORD
Published by F. W. Dodge Corporation
119 West Fortieth Street, New York

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more than SEVENTY-FIVE PER CENT of the work done by all architects, was done by subscribers to THE ARCHITECTURAL RECORD—a Dodge publication—119 West Fortieth Street, New York. Member A. B. C. and A. B. P., Inc.

P.S. The end figure under the magnifying glass above —75.85 —is a reflection of the Record's consistent subscription-sales policy of building up circulation among the architects who have major specifying power. This tremendous massed buying influence of Record subscribers is not due to luck or accident, but is the result of years of painstaking and deliberate effort.

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AGENTS IN PRINCIPAL CITIES

Robert F. Smallwood

ROBERT F. SMALLWOOD, Columbia University School of Architecture, 1911, sees an opportunity for the architect in the specialized designing of buildings for growing wholesale and retail establishments.

"Many such firms," he says, "need more space to accommodate their increasing business, and bring them in closer contact with their retail trade. They occupy, very often, antiquated quarters in an old, congested portion of the city, where their customers have difficulty in reaching their show rooms due to long journeys through crowded streets. Identity of such a firm is submerged if it moves into a portion of a modern office or loft building. Such a move only partially solves the traffic problem, and is apt to interfere with inter-departmental communication as the space occupied is not designed to meet the particular needs of the business."



Mr. Smallwood cites a recent commission of his own to illustrate the point, the mercantile building, shown at the left, he has just done for Johnson and Faulkner, Inc., a 107 year old firm, importers of draperies and tapestries. This interesting structure, on 53rd Street, New York City, was built by The Bethlehem Engineering Company. Administrative offices occupy the three top floors. Display and sales rooms are on the street and second floors. A specially equipped drive entrance for receiving and shipping is provided. Main stock room, on the eighth floor, feeds through the intermediate floors to the third floor shipping department by means of a system of gravity conveyors. Telephones and compressed air tubes are so arranged that all departments can function as a coordinated unit.

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ROBERT F. SMALLWOOD
ARCHITECT
503 FIFTH AVENUE, NEW YORK

April 18, 1930

Mr. C. G. Dunnells,
c/o F. W. Dodge Corp.,
119 W. 40th St., New York.

Dear Mr. Dunnells,

I think it is time for me to thank you for the courtesies I have enjoyed through a desire on the part of your reporter to further my interests. I am, frankly, glad to talk with Mr. Moran when he calls, and I believe you should know that he is, in my case at least, making architects Dodge minded. I appreciate what you fellows are trying to do for us.

I find that one of the best ways to satisfy my clients is to render them not only the best architectural service within my power, but also to render it in the most economical manner.

Because Dodge helps me render this service I am always ready to give information about the projects I am working on to your reporter when confidences are not violated by so doing.

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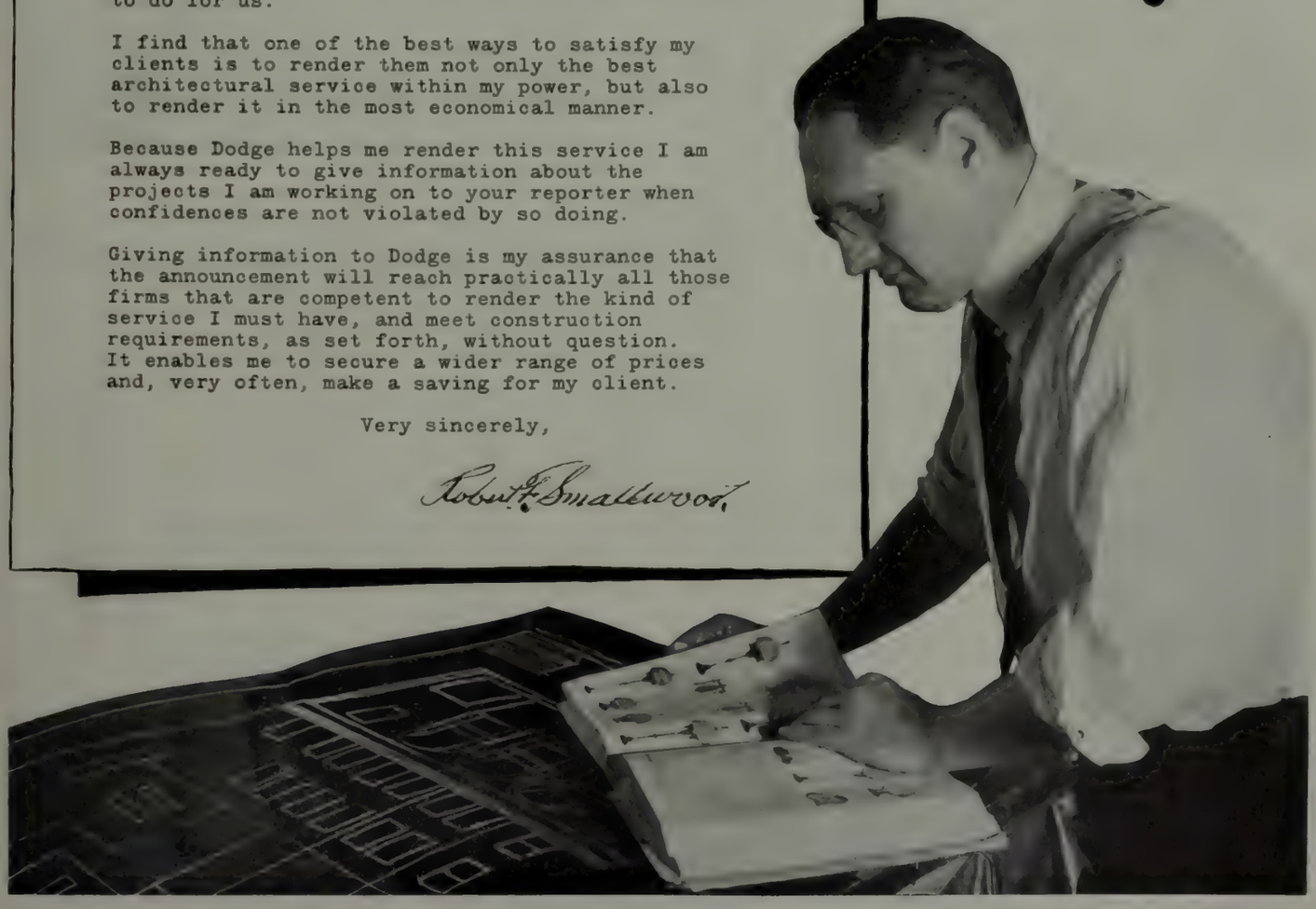
Very sincerely,

Robert F. Smallwood

After graduation, Mr. Smallwood gained his experience in several leading architectural firms of New York City, and through an association that resulted, he handled twelve fire stations in the city.

His further efforts took him into a varied field of architectural design, including the winter estate of Dr. Earle S. Sloan, in North Carolina, together with several college buildings, a hotel, a women's club building, and several institutional buildings for the state of North Carolina.

Being attracted to Florida development he located at Clearwater, where his activities included the Fort Harrison Hotel, a shore development for the Biltmore Hotel, at Belleaire, the grounds and buildings of the West Coast Jockey Club, at Tampa, and the design for the layout of several important sub-divisions including Biltmore Shores, Tampa, Glenwood Estates, Clearwater, Belleview Terrace, Duneden, together with some 30 odd residences.



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Below is a cross section of Mahon Steel Roof Deck showing application of insulation and roofing material.



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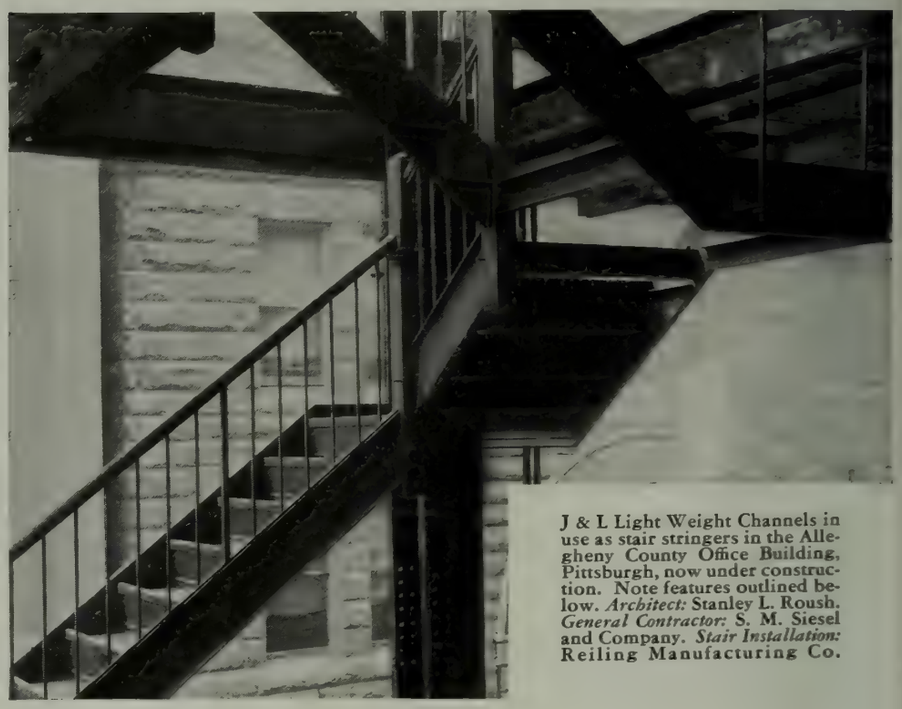
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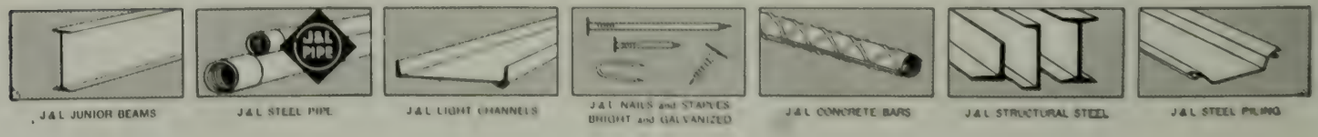
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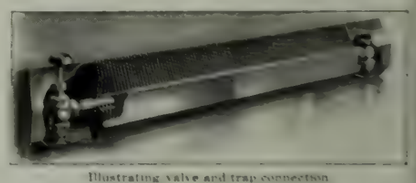
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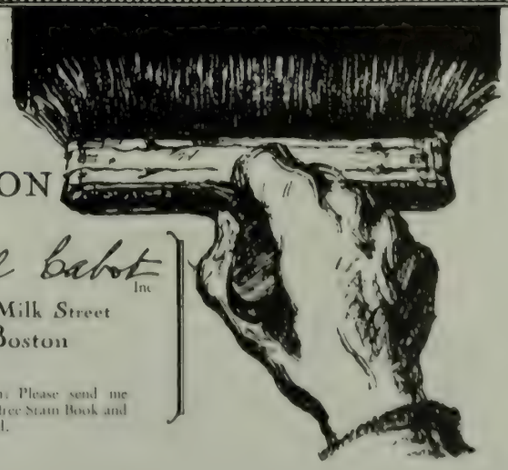
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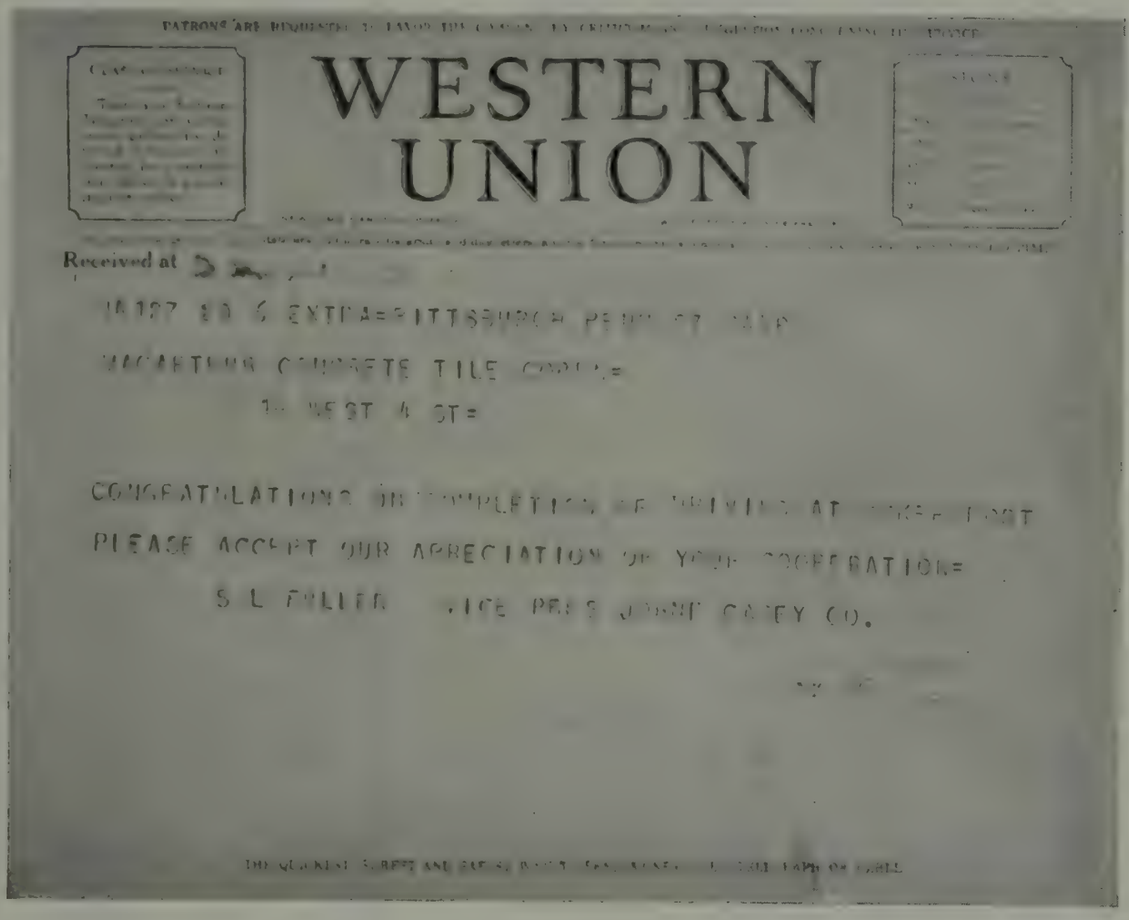
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STEP FOUR—LEVELING UP. *Before nailing, necessary leveling with straight edge is quickly accomplished. Joints come within clips and both ends are nailed.*

THE Bull Dog Method and process of anchoring wood floors over concrete provides a level wood floor that will be permanently satisfactory—and free from buckle and dome.

In addition, Bull Dog Floor Clips ***eliminate dry rot,*** doubling floor life; reduce dead load 18,000 lbs. to 1,000 square feet of slab area; save construction time because there's no fill to dry, no beveling or shimming, and sleepers and finished floor are laid at one time. The Junior Clip (⅝" wide) may be used with or without a fill (dependent on the service duty of the floor.) When a fill between the sleepers is desired, any cheap, inexpensive mix such as sand, cinders or cinder concrete can be used.

Millions of BULL DOG FLOOR CLIPS on over 8,000 jobs carry testimony of satisfaction. Made for 2, 3 and 4 inch sleepers. Regular and Junior Styles. Friction tight nailing facilities (nails gratis.) Write for catalog and samples.

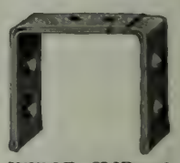
THE BULL DOG FLOOR CLIP CO.
108 N. First Ave., Winterset, Ia.
135 Representatives—15 Warehouse Stocks

BULL DOG
Floor Clips



REGULAR CLIP—*3 sizes, 2, 3 and 4 in. 20 gauge galvanized iron.*

Original Patent granted June 14, 1921
Reissue Patent granted June 29, 1924
Process Patent granted May 19, 1925



JUNIOR CLIP—*3 sizes, 2, 3 and 4 in. 18 gauge galvanized iron.*

The Bull Dog Buck Anchor

THE Bull Dog Buck Anchor forms a rigid truss in the mortar joint which prevents the movement of the buck in any direction. It eliminates the use of nails, screws, bolts, tie-wires, strips of metal lath and iron, and all pounding against the back sides of the buck. Made in three widths of No. 10 Galvanized Steel Wire; 3 in., 4 in., 6 in. Ten per cent of anchors in packing cases are shorts to take care of spaces too short for the regular size anchor.





Windows are INSTALLED Once — They are CLEANED Hundreds of times



The cost of windows to the owner of a building merely begins with their installation. They must be cleaned frequently during the life of the building. The cost of cleaning windows over a period of years doubles, trebles, and redoubles again and again the initial cost. For that reason, the installation of Williams Reversible Window Equipment which makes possible inside cleaning—at a 50% reduction in cleaning costs—means a remarkable saving to the owner of the building.

The Williams Pivot Sash Company

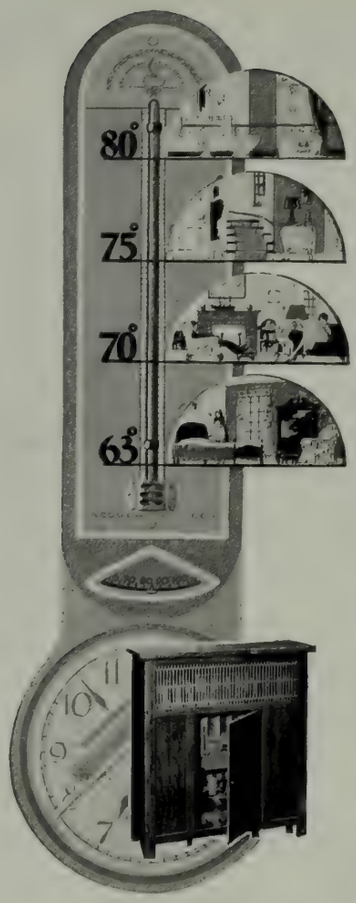
East 37th St. at Perkins Ave.
Cleveland · Ohio

For 26 years manufacturers and installers of Reversible Window Equipment



WILLIAMS REVERSIBLE WINDOW EQUIPMENT

Clean Your Windows from the Inside



Sensible temperature

NOW each room in the home can be heated at any desired temperature. 80 degrees for the bathroom; 75 degrees for the nursery; 70 degrees for the living room; 63 degrees for the unused bedroom. Sensible temperature.

The Duplex Unit Control Gas Heating System sets the pace for comfortable, sensible, economical home heating. How often have you wished for just such a system to satisfy the demands of your clients?

Send for A. I. A. File

Mr. Architect and Heating and Ventilating Engineer, you should learn all the facts concerning the Duplex Unit Control Gas Heating System. For your especial benefit we have prepared all the facts and bound them in a file folder for convienence in reference. A copy will post you on the latest development in scientific home heating. Send for it.

DUPLEX UNIT CONTROL GAS HEATING SYSTEM

ROBERTS-GORDON APPLIANCE CORPORATION

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CURTISS BUILDING BUFFALO, N. Y.



Who wants to "do dishes"

When a movie's calling?

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CONOVER Electric DISHWASHER SINK

Meets the latest demands for efficiently equipped kitchens

You can greatly increase the sales and renting possibilities of houses and apartment buildings by specifying this latest approved kitchen equipment. Tested and approved by Good Housekeeping Institute, Delineator Home Institute, Priscilla Proving Plant.

The *CONOVER Electric Dishwasher Sink* requires no special roughing in, no specially low trap, and is interchangeable with the regular kitchen sink: therefore, ideal for old as well as new buildings. Requires space of only 25 x 42½ inches. Rubber plated dishracks; large flexible capacity; sliding drainboard top; self cleansing, and other exclusive features.

***The Sink Model CONOVER* is sold exclusively through the Plumbers' Trade. Portable *CONOVERS* are sold only through the Electrical Trade.**

Write for folder "The Kitchen of Tomorrow" and full facts about either Sink or Portable Model CONOVER.

THE CONOVER COMPANY

Dept. R-6 140 SO. DEARBORN ST., CHICAGO

District Offices:

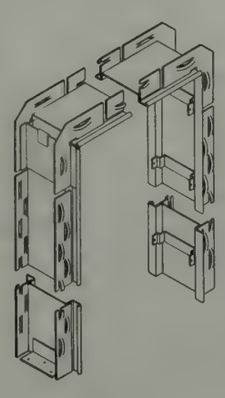
101 Park Ave. (Architects Bldg.), New York; 1700 Walnut St., Philadelphia; 115 Chauncy St., Boston



Who Would Have Thought It!

Little did our fathers realize the tremendous improvements in construction methods that a few years would bring. Kalman Steel Buck, and Jamb and Buck offer construction advantages far in advance of any other door frames. Here are 7 of the 15 advantages:

1. **Replace wood bucks with heavy steel members.**
4. **Provide steel grounds, terminals, and positive attachment for plaster.**
5. **Overlap and closely engage the sides of the tile and interlock with the wall structure.**
6. **Make standing trim unnecessary.**
9. **Make possible inspection of the tile setting after wall is constructed.**
10. **Permit the inspection of wall anchors after they are in place.**
15. **Eliminate plaster cracks by providing surfaces to which plaster naturally adheres.**



Greater beauty of line is obtained by the use of Kalman Steel Buck, or Jamb and Buck. Form truly follows function. May we send you photographs showing important hotels, apartments, public buildings, or private homes where Kalman steel door frames are used?

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WITHIN the steel wall of conduit runs the vital force that makes the modern building a possibility.

The black and orange Fretz-Moon Label is your assurance of uniformly strong conduit, perfect welds, and threads so clean that installation schedules are expedited on every job.

Specify by the trade names—Enamelite or Galvite—and look for the little label that means so much.

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ONE PIECE DESIGN



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SO QUIET you can scarcely hear its powerful flushing action. That's why the T/N is for *any* bathroom . . . large or small.

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Dept. 1406, 220 Delaware Avenue, Buffalo, New York

T/N

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Telephone companies have to be far-sighted. Their completely equipped buildings must serve coming generations, and be a source of pride to the community. So the Syracuse headquarters building of the New York Telephone Company, designed by Voorhees, Gmelin and Walker, Architects, of New York City, was built of reinforced concrete throughout. As pictured above, the beautiful exterior is of cast stone in which the richness of hand-tooling is combined with the speed and economy of reproduction from models. This practical and fire-safe structure will endure long past the time when its capacity and facilities are adequate for the growing city it serves.

Informative booklets on concrete construction gladly mailed on request

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Method of Application Means 50% more Effective Insulation . . .



The value of insulation to any home is in direct proportion to the amount of heat leakage it prevents . . . Plaster bases or sheathings do not provide adequate protection from heat and cold nor do they permit the heating plant to deliver full efficiency. This is especially true with automatic heating plants, either oil or gas. The home must be adequately insulated to assure economical operation.

FLAX-LI-NUM with two air spaces actually produces the greatest amount of insulation from an economical thickness of material. It is 50% more effective than a similar layer of insulation used as a plaster base or sheathing. According to the U. S. Bureau of Standards tests, ½ inch of FLAX-LI-NUM applied by this method is equal to more than ¾ of an inch at any other place in the wall.

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This Anti-Slip Tread Assures Safety Ahead

WHEREVER "A.W." Diamond Pattern Floor Plate is installed, walking and trucking are safe and secure.

The pattern of "A.W." Floor Plate is composed of oval-shaped, bevel-edged diamonds with rounded tops. The diamonds are spaced and sized to provide ease and comfort under-foot. Because of the oval-shape and beveled edges of the diamonds, feet get a sure, certain grip at all times.

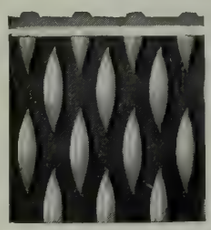
Moreover, slips and falls due to the collection of water or oil on the flooring cannot occur with "A.W." Floor Plate. Water and oil quickly flow off the rounded tops of the diamonds. The pattern is self-draining from every angle.

Let us send you samples of "A.W." Floor Plate, and interesting booklets. Write today.

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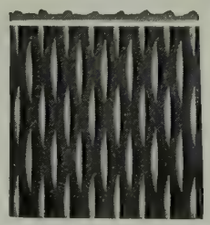
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"A.W." Diamond (¼ Size)
Furnished in rolled steel (also in aluminum) and all commercially-rolled metals, in thicknesses of from ⅛" to 1".

"A.W." Diamondette (¼ Size)
Furnished in rolled steel (also in aluminum) and all commercially-rolled metals, in Nos. 16 to 12 Gauges, and in other thicknesses up to ⅜".





Chicago Daily News Uses United Metal Doors

OF exceptional interest to architects because it pioneered the use of air rights in the West, the Chicago Daily News Building is an example of all that is modern and efficient in building construction.

It is a matter of pride to us that approximately three hundred swing doors, as well as dumbwaiters and telephone booths are of United Hollow Metal construction.

The frequency with which United products and United engineering service are associated with projects of this calibre speaks more eloquently than volumes of words of the outstanding excellence of both. Nothing demonstrates more clearly that there is no substitute for experience and no short cut to true craftsmanship.

THE UNITED METAL PRODUCTS CO.
CANTON, OHIO

SEE OUR Catalogue in SWEETS



The Chicago Daily News Building

Contractors:
Hegeman-Harris Company
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CONFIDENCE

Consistent with public utility methods, the International Telephone & Telegraph Building is of thoroughly sound construction. It is architecturally comparable to its fine neighbors in downtown New York, and will be called on surely to serve long and economically.

As in so many of America's greatest structures the brass pipe selected registers another vote of CONFIDENCE in Bridgeport "Plumrite." Here is a "known quantity" for the modern builder—proving itself again and again—outlasting buildings through upwards of fifty years of service records.

There is no substitute for the test of time—there need never be a substitute for Bridgeport "Plumrite."

All "Bridgeport" Pipe Is "Plumrite"

To identify mixtures, to protect you, these trade-marks appear every nine inches on all Bridgeport "Plumrite" Pipe.



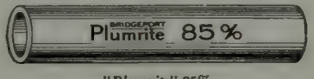
"Plumrite" Standard
For Good Water Conditions. Known as Muntz metal. Contains 60% Copper and 40% Zinc. Can be bent hot and cold. Very satisfactory. Highly recommended.



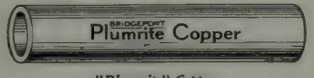
"Plumrite" 67%
For Good Water Conditions. Contains 65% to 68% Copper—balance Zinc. Can be bent cold only. Furnished on request.



"Plumrite" Admiralty
For Hot and Cold Salt Water. Contains 70% Copper, 1% Tin, and 29% Zinc. Very satisfactory.



"Plumrite" 85%
For Chemically Treated, Salt, and Corrosive Waters. Contains 85% Copper, 15% Zinc. Known as Red Brass. Also highly recommended for ground service.



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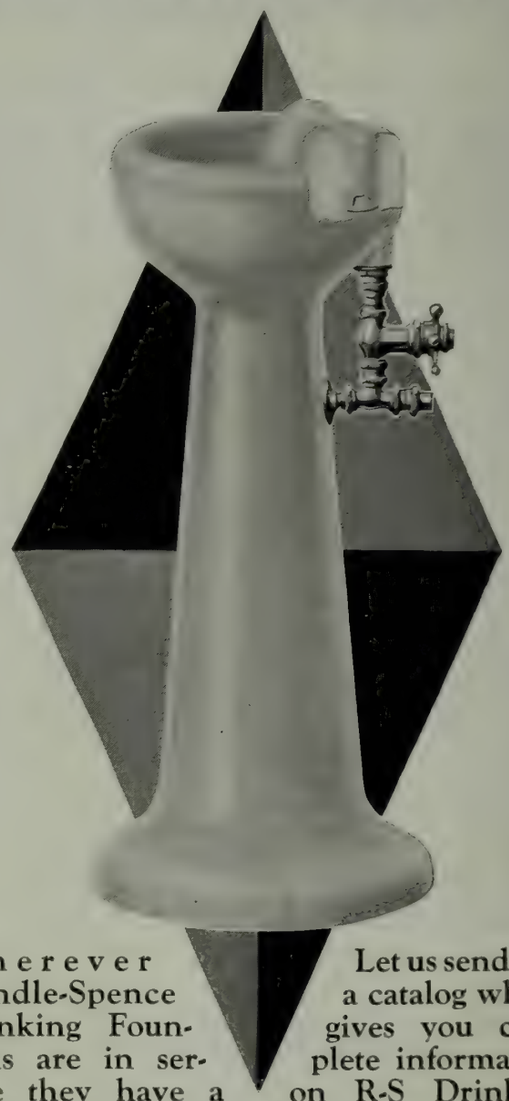
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R-S FOUNTAINS



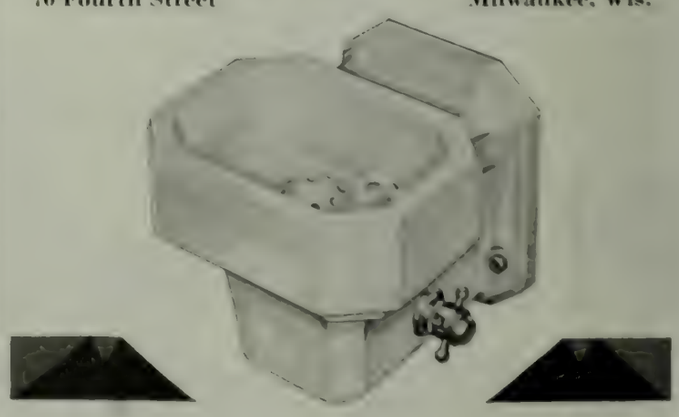
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R-S N-93 and N-94 fountains can now be had in colors. Write for special bulletin describing "Color" fountains in detail.

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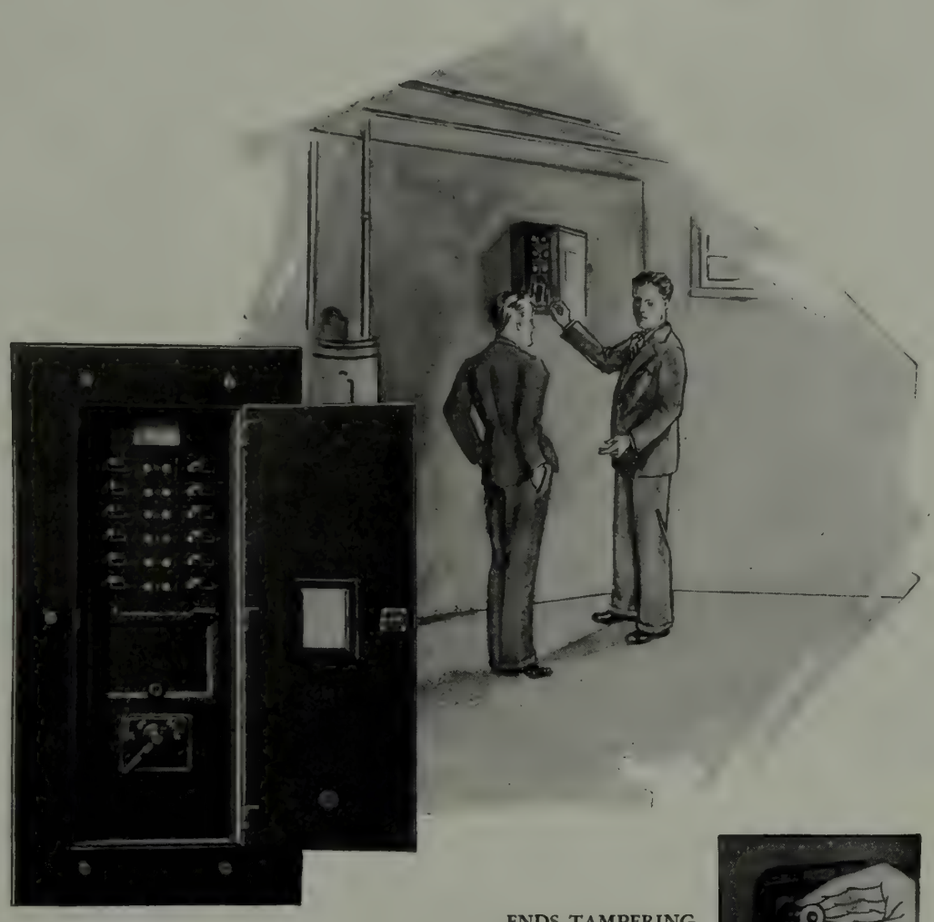
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When Tampering Tenants say . . .

"Got a penny"

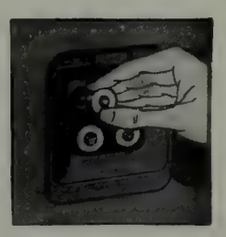


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In tampering with the panelboard he tampers with your reputation. The protection to the wiring is destroyed . . . the fire hazard increased. But who knows it . . . until a mysterious fire brings the engines clanging down the street?

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ENDS TAMPERING WITH FUSES



ELIMINATES SERVICE CALLS

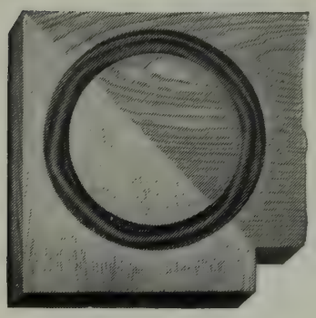
Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

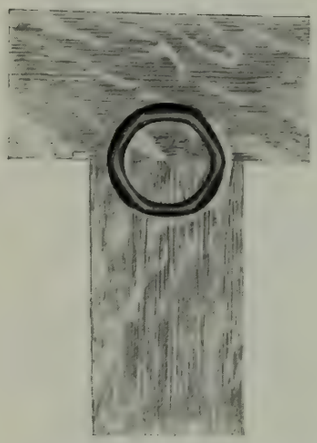
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permanent and perfect
—if your Contractor uses the Evans Ring Joint Machine





Our Model M Machine—(illustrated)—makes any single joint in fifteen seconds, cutting the groove and seating the locking ring without moving the stock on the table. One man operation, saving time and labor cost and turning out jointed woodwork ready for *immediate* use. The Model M handles stock from 3/8" to 1½" in thickness, and uses 1", 1¼", 1½", 1¾", or 2" rings according to requirements. On your next job, have your woodwork contractor write us for sample joint, prices and terms for machine and rings.

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W. L. EVANS
Washington, Indiana



The above—Evans ring joint machine Model M, electrically operated—one man control

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Insure Adequate Volume at High Pressures

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Westcos' wide operating range makes them the ideal pumps for booster service in modern commercial buildings. In such a capacity they deliver maximum results efficiently and economically.

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Review the important Westco features listed below

- Wide operating range.
- No end thrust at bearings due to perfect hydraulic balance.
- Only one moving part.
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- High pressures in single stage.
- Ball bearing construction.
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- Capacities from 5 to 400 g.p.m.





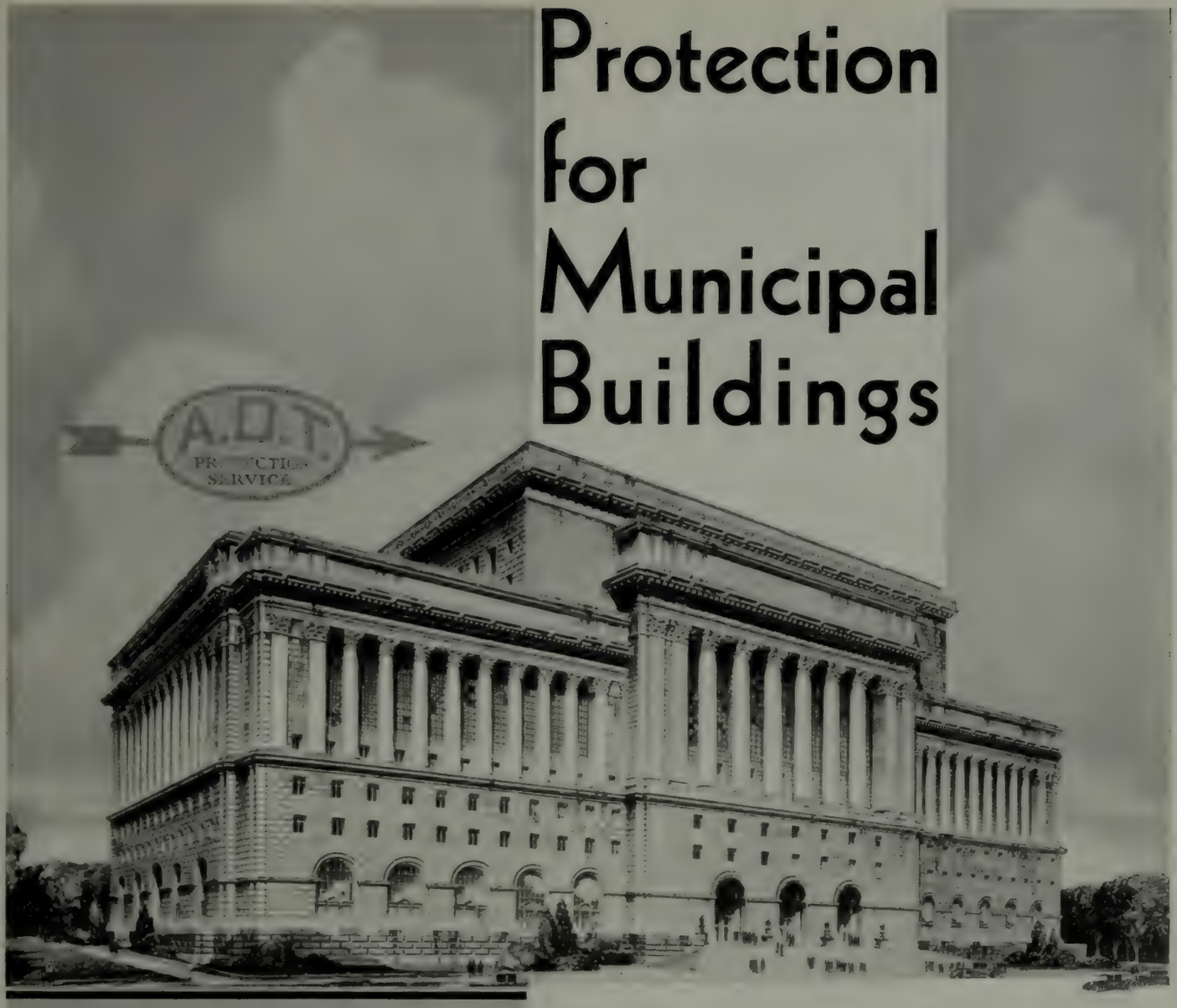
The impressive Horn and Hardart building is located at 16th and Chestnut Sts., Philadelphia, Pennsylvania.

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FACTORY AND GENERAL OFFICES: DAVENPORT, IOWA

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Protection for Municipal Buildings



Milwaukee County Court House

Albert R. Ross, Architect
S. M. Siesel Co., Builder
Uihlein-Ortmann Elec. Co.
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Landmarks of Modern Protection

THE new $7,000,000 Milwaukee County Court House, for instance, will have positive protection including A. D. T. Central Station Night Watchman Supervisory and Fire Alarm Service and an A. D. T. local gong system.

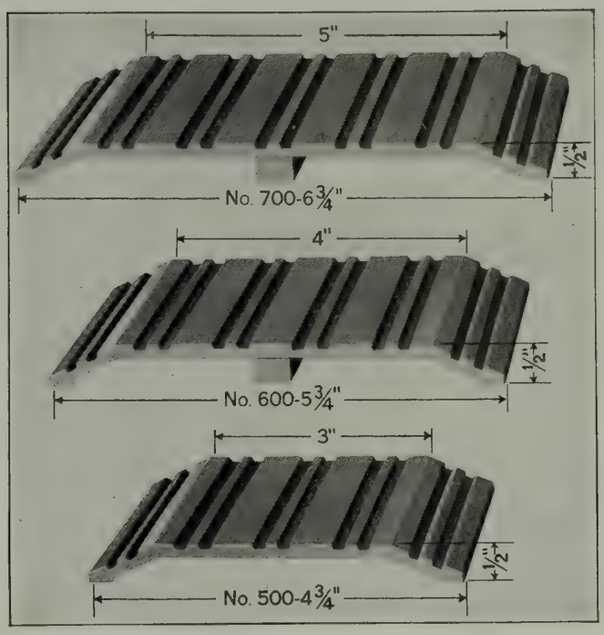
To many other municipal buildings throughout the country A. D. T. Central Station Service brings the advantages of a positive check on watchman's activities and prompt transmission of coded fire alarms.

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New architects' catalog with suggested specifications now ready. Send for a copy.

Controlled Companies of
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and now...



Thresholds of ARCHITECTURAL BRONZE *by*

Naturally a high standard of design can safely be taken for granted in these new Rixson Metal Thresholds.

For use with Rixson Floor Checks they can be delivered ready drilled for installation, taking the place of floor plates. The grooved surface, however, is conveniently designed for numerous means of floor check lay-outs, as well as being suitable for openings where floor checks are not used.

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THE OSCAR C. RIXSON CO.
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Screens KANE QUALITY *Metal or Wood Frame*

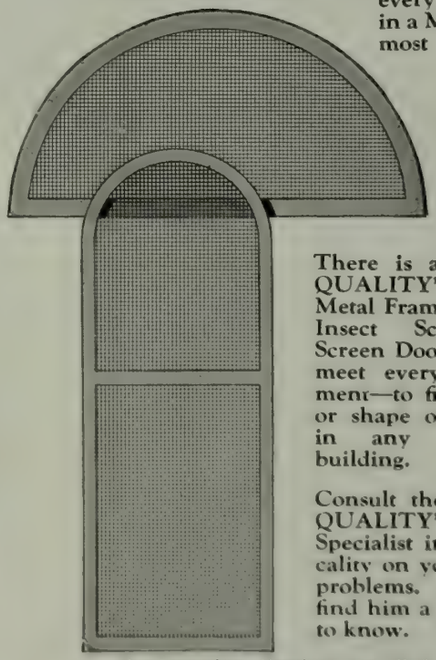


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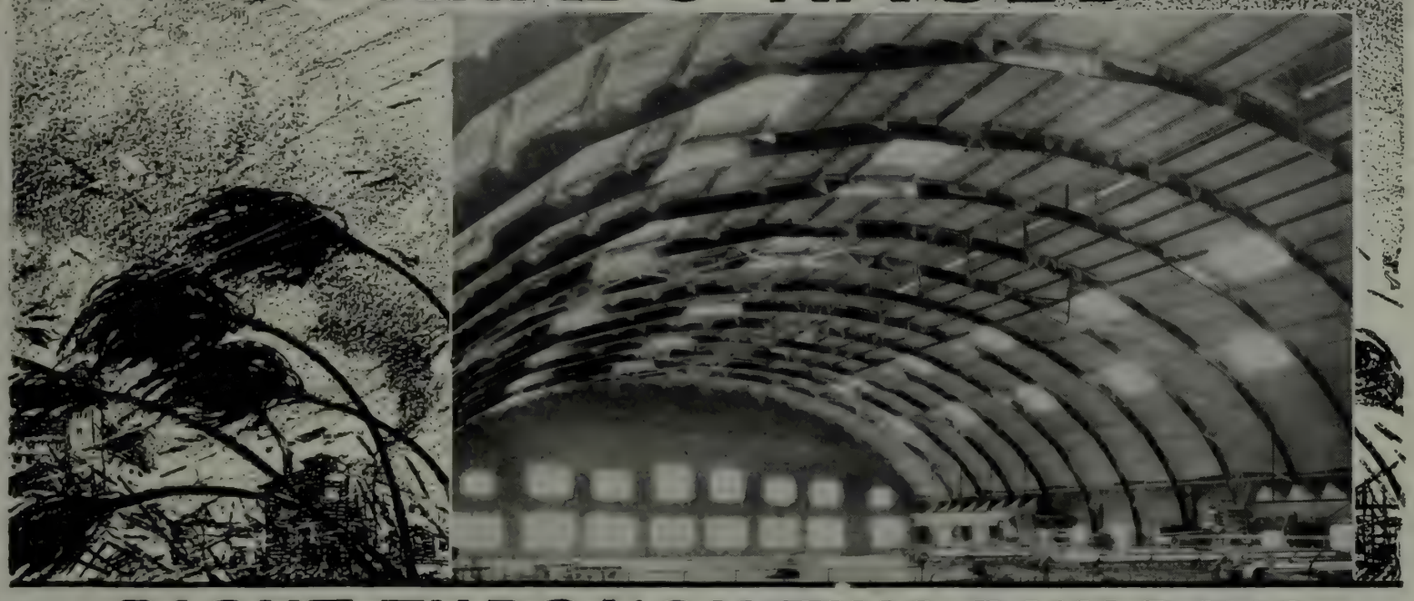
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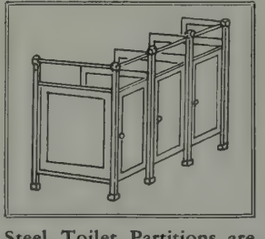
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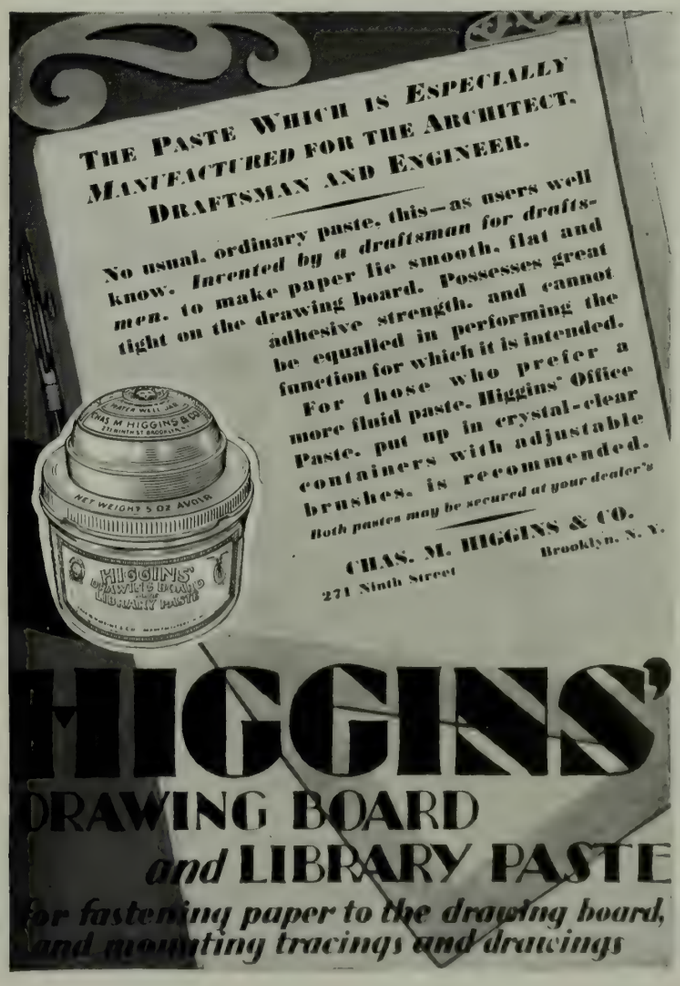
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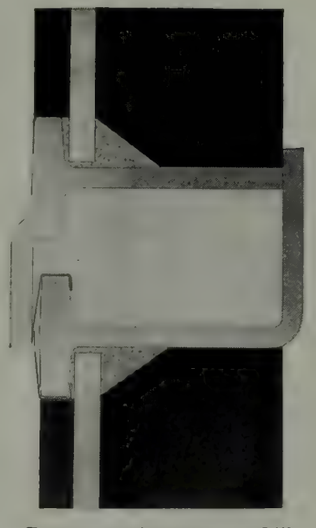
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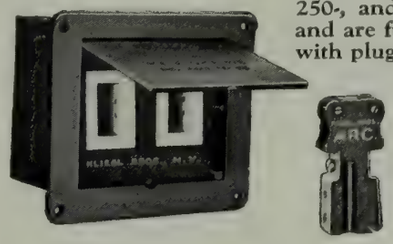
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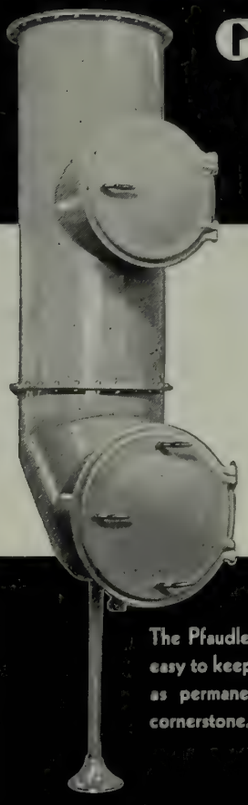
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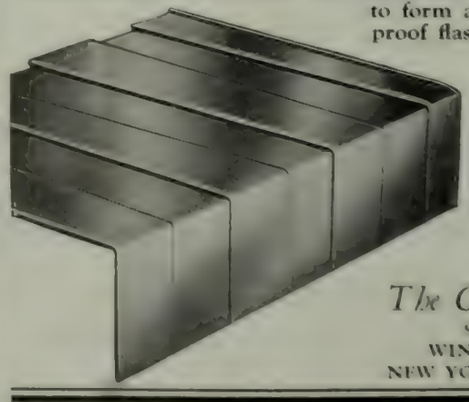
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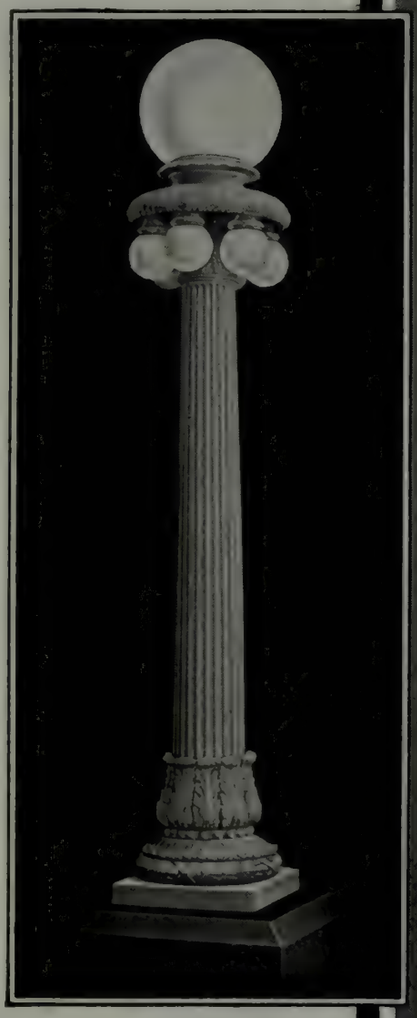
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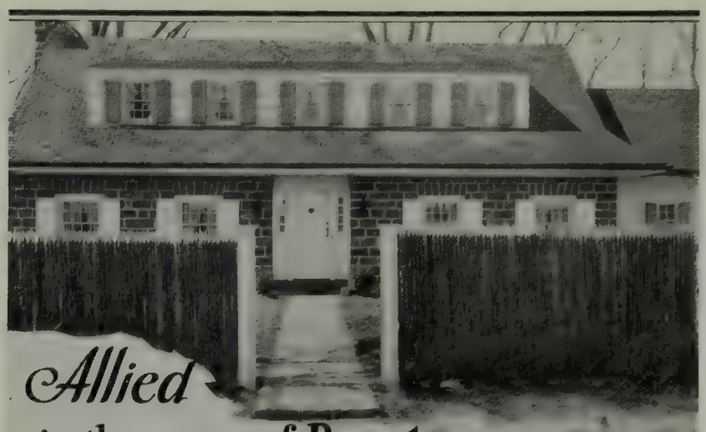
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Miami, Fla.
Minneapolis, Minn.
New Orleans, La.
New York, N. Y.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Richmond, Va.
Rochester, N. Y.
St. Louis, Mo.
San Antonio, Tex.
San Francisco, Cal.
Seattle, Wash.
Tampa, Fla.
Tulsa, Okla.

CANADA
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Toronto, Ont.
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SOON — A new Bel-Sun-Lite Catalog replete with lighting information especially prepared for architects.

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NEW JERSEY'S TALLEST

LEFCOURT-NEWARK BUILDING, NEWARK, N. J.
Architect: Frank Grad, Newark, N. J.
Engineer: Eadie, Freund & Campbell, New York City
Plumbing Contractor: Jaehnig & Peoples, Newark, N. J.
Heating Contractor: Schrenell Bros., Newark, N. J.



Unusually effective in interior plan with its commanding and graceful exterior lines, this recently completed building ranks with some of the finest in the land, a structure of which New Jersey may well feel proud. Thirty-seven stories from street to tower—the highest building in the State of New Jersey—the Lefcourt-Newark Building is the latest addition to Newark's skyline. Naturally the architects and engineers, experienced in specifying for some of America's finest buildings, turned to time-tested and quality-proven material.

Thus, as in many previous instances, they chose NATIONAL for the major pipe tonnage. In addition to NATIONAL Pipe for the heating, soil and waste lines, they specified NATIONAL Copper-Steel Pipe for the vent lines and rain leaders as an additional protection against atmospheric corrosion. Many years of experience and numerous service tests have proven that copper-steel pipe gives added life to those lines exposed to alternate wet and dry conditions. Write for Bulletin No. 11, describing—

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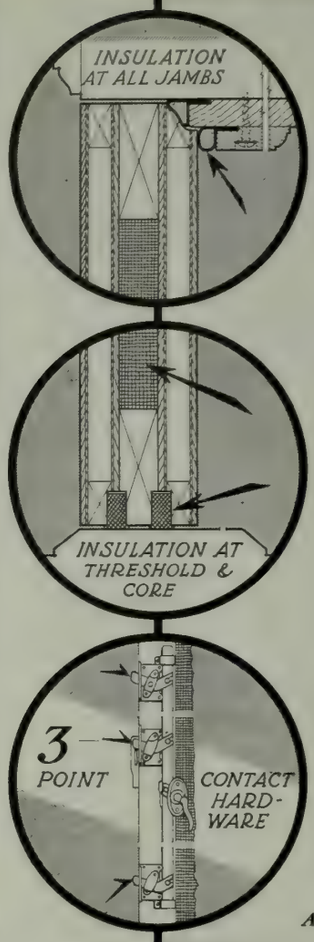


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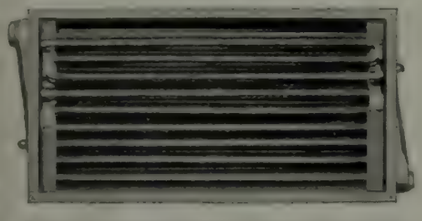
Albert Kahn
Architect-Engineer

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Photography by Davis B. Hillmer

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ARCHITECTS' ANNOUNCEMENTS *and* NOTES IN BRIEF

CALENDAR OF EVENTS
GENERAL ANNOUNCEMENTS

May 20-Oct. 1	Exhibition of modern Architecture and Industrial Arts at Stockholm, Sweden.
June 9-July 19	Summer session of New York University School of Architecture.
June 19-30	The Fourth Pan-American Congress of Architects and Architectural Exhibition at Rio de Janeiro.
Aug. 4-9	International Exposition of American Import Trade, Grand Central Palace, New York.
Aug. 12-21	Study Tour of the International Housing Association in Denmark, Sweden and Norway.
Sept. 7-14	Twelfth International Congress of Architects, Budapest, Hungary.
Oct. 7-10	Annual convention of the Illuminating Engineering Society. Hotel John Marshall, Richmond, Va.
Oct. 8-12	Sixth National Conference of Church Architecture, Cleveland, Ohio.
Nov. 18-29	Art Exhibition, Royal Institute of British Architects, London (9, Conduit Street).
1930	Entries in the competition for the most beautiful bridge in North America are invited. Information can be had from F. H. Frankland, c/o Bridge Committee, American Institute of Steel Construction, Inc., 200 Madison Ave., New York City.
In Oct. 1930	The Department of Architecture of the University of New York will begin a series of lectures on "Promoting and Financing Building Projects."

LUTAH MARIA RIGGS, Architect, and WILLIAM ALLEN HORNING, have formed a partnership for the practice of Architecture.

THE FIRM of Morris and Weinberg, Architects, has been dissolved owing to the death of Mr. Charles Morris, F.A.I.A. Mr. Joseph L. Weinberg will continue independently at The Union Building.

IVAN H. RILEY AND COMPANY, Architects and Engineers, have moved to their new address at 203 North Wabash Avenue.

JOHN WOOLLEY, Architect, has moved his office to 29 West 46th Street, New York City.

MAX SANDFIELD, Architect, has opened offices recently in the Milam Building, San Antonio, Texas.

GEO. P. TURNER, Architect, and E. M. VAN ARMAN, Architect, have formed a partnership with offices at 1221 Martin Building, Birmingham, Ala.

EDWARD D. SLATER, Architect, formerly of the firm of Turner and Slater, will practice in the future under the name of Edward D. Slater, Architect, with offices at 635 Martin Building, Birmingham, Ala.

WALLIN AND COMER, Architects, have dissolved partnership. Mr. Arthur F. Comer will practice at 909-910 Realty Building, Savannah, Georgia.

THE CRAFTEX COMPANY have moved into their new quarters at 60 East 42nd Street, New York City.



WALTER A. McDOUGALL, Architect and Engineer, has moved to his new office at 360 North Michigan Ave., Chicago.

EDWIN H. BROWN

Edwin Hacker Brown died in Minneapolis, on Monday, April 21, after a brief illness from pneumonia. He was 54 years old.

As a member of the Architectural firm of Hewitt & Brown, Mr. Brown contributed heavily to the architectural progress of the Northwest. He devoted himself to his native city with an always active interest in eliminating unsafe structures and hodge-podge arrangement for orderly sanitary growth.

He was a past secretary of the A.I.A., and still a member of President Hoover's commission of the Department of Commerce on basic building codes at the time of his death.

ILLINOIS STUDENTS WIN BRIDGE PRIZE

Three students at the University of Illinois won the three cash prizes of 1930 offered by the American Institute of Steel Construction for the most beautiful design of a steel bridge submitted by architectural students. These prizes, amounting to $500, $250, and $100, respectively, were made through the Beaux-Arts Institute of Design. A total of 160 students enrolled in the competition and submitted sketches in the preliminary judgment. The problem called for a design of a steel bridge of 650 feet total length and with a main arch span of 325 feet.

Architects welcome this new frame with locked sill-joint . . . of genuine white pine



A beautiful summer home built on the St. Croix River, Minnesota, for George B. Lane, Investment banker. Andersen casement No. 702; architect, W. C. Whitney of Minneapolis.

FOR character, for beauty, for a century of endurance, the architect now can rely on these casement frames of genuine white pine . . . the new Andersen Master Frame with locked sill-joint.

Consider the added value built into these new casements, perfected by Andersen at frame headquarters . . Bayport, Minnesota. First consider the locked sill-joint, a guarantee of rigid, permanent construction. Then the wide blind stop feature . . weathertight insurance. Then the 3 inch per foot sill slope for good drainage. Also the many other Andersen features, including the patented, noiseless pulley.

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Remember, there is an Andersen Master Frames for every type of construction. Send for your copy of our new catalog, No. 500, or turn to Sweet's, pages B2549-72. ANDERSEN FRAME CORPORATION, Headquarters; Bayport, Minnesota, represented by 3,300 leading jobbers and dealers.

Andersen MASTER Frames

OF GENUINE WHITE PINE — FOR WINDOWS AND DOORS

BAYPORT — MINNESOTA

The prizes were awarded at the final judgment to George D. Recher, first; Russell O. Deeter, second, and Don P. Ayres, third, all of the University of Illinois.

REGISTRATION OF ARCHITECTS, AGAIN

A registration law for architects in every State in which such a law does not now exist is being actively urged by The American Institute of Architects. The Institute's committee on registration laws has reported that the work of registered architects is better than the poor material turned out by amateur and untrained practitioners, both in design and safety of construction. Arthur Peabody, of Madison, Wisconsin, State Architect of that state, chairman of the committee, says:

"It is a short-sighted policy to rest upon the condition that architects in a certain State are doing good work and plenty of it, without registration, or for an architect to say that his talent is above the need of licensing. No other great profession carries on that way.

"Registration is a matter of interest also to the engineers of the country, who, through their societies, are reported to be moving forward strongly to secure the necessary legislation for registering professional engineers."

ARCHITECTS TELL HOW TO CHOOSE AN ARCHITECT

A leaflet addressed to "each board of education of New Jersey Municipalities" was recently issued cooperatively by nine architects' societies in that state. It tells about "Choosing an Architect." Some excellent advice is given, in particular on the subject of "the Free Sketches Fallacy" and "the Scramble." The conclusion is that rarely can anything take the place of the Board's "seeking out a good architect before sketches or other drawings are made."

SUMMER SCHOOL AT FONTAINEBLEAU

About one hundred and twenty-five American artists and art students will be registered at the American School of Fine Arts at Fontainebleau for the coming summer session, according to an announcement made by Jacques Carlu, director of the school and professor of architecture at the Massachusetts Institute of Technology. The summer session will begin on June 25th and continue for three months.

The Fontainebleau School, was founded eight years ago through the initiative of the French Government and the ministry of Fine Arts. Administration is in the hands of a French committee and the enrollment of students is under the direction of a committee of prominent Americans, among them, Mr. Whitney Warren, Mr. Ernest Peixotto, Mr. Edwin H. Blashfield, Mr. Kenneth M. Murchison, Mr. J. Monroe Hewlett, Mr. James Earle Frazer, Mr. Benjamin Wistar Morris, Mr. Howard Greenley, Mr. Thomas Hastings, Mr. John Mead Howells, Mr. Hermon A. MacNeil, Mr. James Gamble Rogers, Mr. Harvey Wiley Corbet, Mr. W. Howard Hart and Mr. Ronald H. Pearce.

The curriculum of the school is designed primarily for professional artists and advanced students, although provision is to be made for a few beginners. Enrollment for the school of architecture is made through Mr. Whitney Warren. The New York address for the Fontainebleau School is 119 East 19th Street.

A MUSEUM OF INDIAN LIFE

Plans for the construction of a museum and laboratory for the study of American Indian life in the heart of the cliff-dwelling area of New Mexico have been completed with the selection as architect of John Gaw Meem of Santa Fe.

When completed the project will provide research laboratories, museum exhibitions, libraries, lecture halls and adequate facilities for graduate instruction in archaeology as well as public education in the history of America's native races. Standing in the center of the cliff-dwelling area, and near the largest Pueblo Indian villages, the laboratories will enable research workers to study New Mexico's valuable historic relics without their removal from the state.

ARCHITECTURE FOR ILLUMINATING ENGINEERS

The Illuminating Engineering Society believes that in order to be of real service to the architect, the illuminating engineer must know more about the architect's problems and be able to talk to the architect in his own language. To accomplish this purpose two courses in the fundamentals of architecture for illuminating engineers are being organized by the Society to be held concurrently in the early fall.

One of these courses, limited to 75 registrations, will be held at the Architectural League Club House, New York City, under the auspices of Columbia University, September 8 to 13, inclusive; and the other, limited to 100 registrations, will be held concurrently at the Art Institute, Chicago, by the Schools of Architecture of the University of Illinois and the Armour Institute.

JOHNS-MANVILLE ABSORBS STEVENS SOUND-PROOFING

The Johns-Manville Corporation have announced the purchase of the assets and patents of the Stevens Sound-Proofing Company, of Chicago, manufacturers of patented structural products for sound insulating in walls, floors and ceilings.

"FIR-TEX" INSULATOR

Made from wood base without any adhesive binder, a new insulation material called Fir-Tex, has been produced which it is claimed embodies good insulation plus unusual structural strength, water-proofing and fire-resisting qualities.

The method of manufacture involves the use of sawmill waste, principally Douglas Fir.

The plant of the Fir-Tex Company is located at St. Helens, Oregon.

NATIONAL GYPSUM TAKES OVER SALE OF MAFTEX INSULATION

According to a joint announcement just issued by William L. Geddes, president of the MacAndrews and Forbes Company of Camden, N. J., and M. H. Baker, president of the National Gypsum Company of Buffalo, N. Y., the entire sales and distribution of Maftex Insulation Board have been taken over by the National Gypsum organization.

This arrangement will result in Maftex being added to the Gold Bond line of gypsum and lime products. The National Gypsum Company will institute an aggressive sales and advertising campaign to make Maftex well known as a Gold Bond product. Maftex is made from the roots of the licorice tree.

The STRUCTURAL STEEL



for this new office building at No. 1 North LaSalle St., Chicago, was fabricated in our plant at Gary, Indiana, from steel materials produced by Illinois Steel Company and Carnegie Steel Company.

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K. M. VITZTHUM & CO., Inc.

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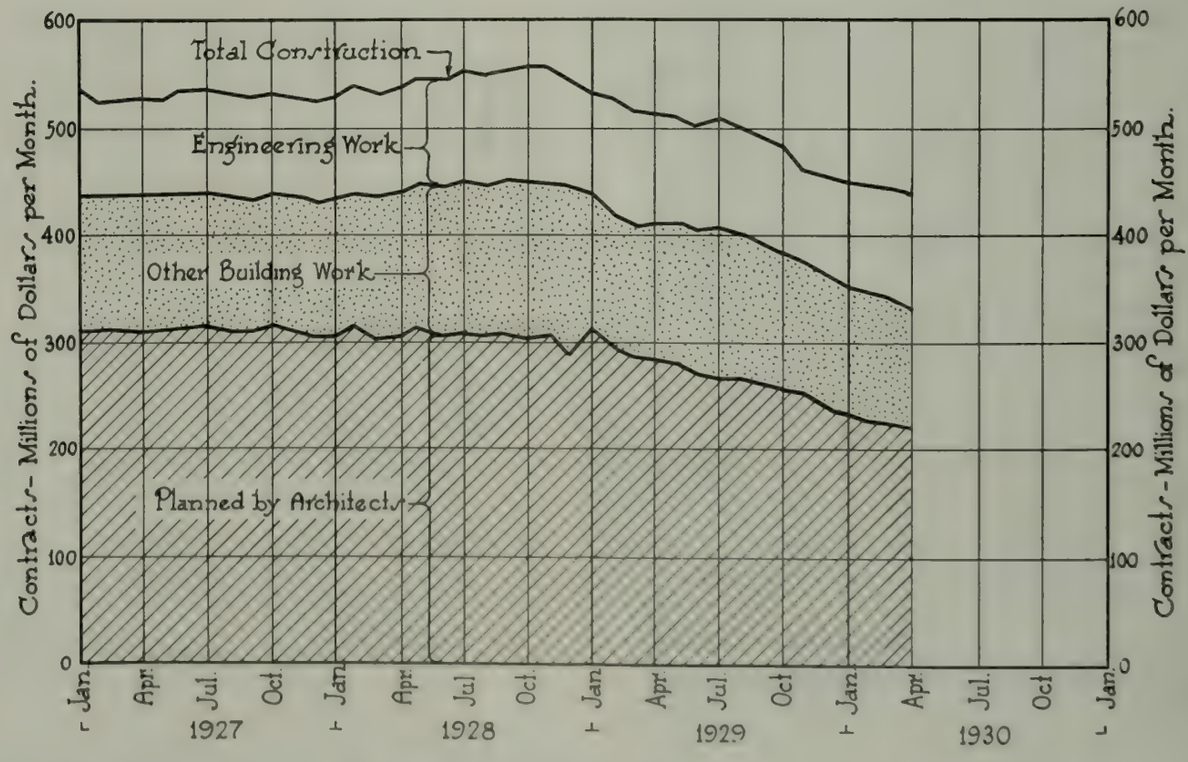
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CONSTRUCTION STATISTICS

From the records of F. W. DODGE CORPORATION, Statistical Division. The figures cover the 37 states east of the Rocky Mountains and represent about 91 per cent. of the country's construction volume. They include projects amounting to $5,000 and up.

First Four Months, 1930

	TOTAL CONTRACTS		WORK PLANNED BY ARCHITECTS		
	Number of Projects	Valuation	Number of Projects	Valuation	Per Cent. of Total
Commercial Buildings	8,060	$277,198,100	3,076	$222,482,200	80
Industrial Buildings	1,867	184,218,700	649	55,899,700	30
Educational Buildings	1,124	110,754,200	962	106,569,700	96
Hospitals & Institutions	339	65,237,300	264	59,534,900	91
Public Buildings	422	43,735,200	252	34,775,900	80
Religious & Memorial Buildings	610	34,042,700	419	31,894,900	94
Social & Recreational Projects	795	45,899,300	496	40,639,500	89
Residential Buildings	24,816	366,028,600	6,469	213,438,500	58
Total Building	38,033	1,127,114,100	12,587	765,235,300	68
Public Works & Utilities	5,221	452,909,800	97	19,096,700	4
Total Construction	43,254	$1,580,023,900	12,684	$784,332,000	50
Total Construction, 1st 4 months, 1929	55,831	$1,897,889,800	16,328	$995,548,400	52



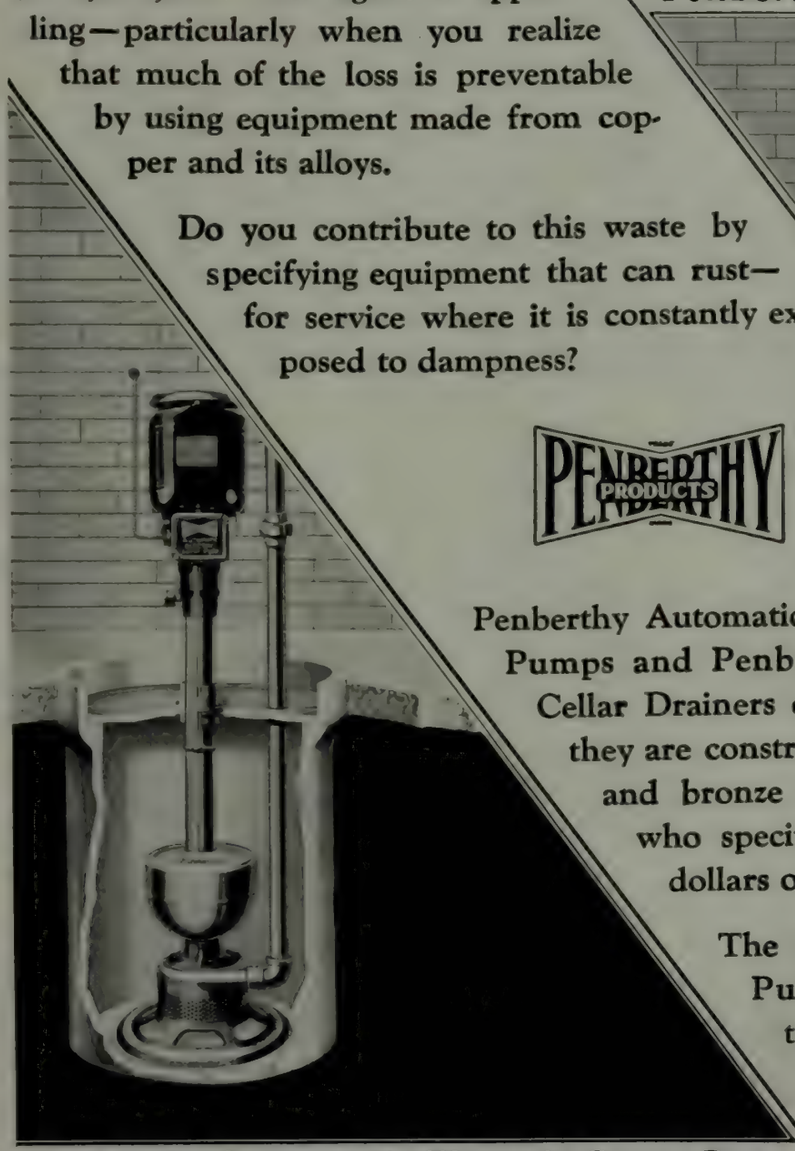
General Trend of Building and Engineering Construction

A $600,000,000 Waste!

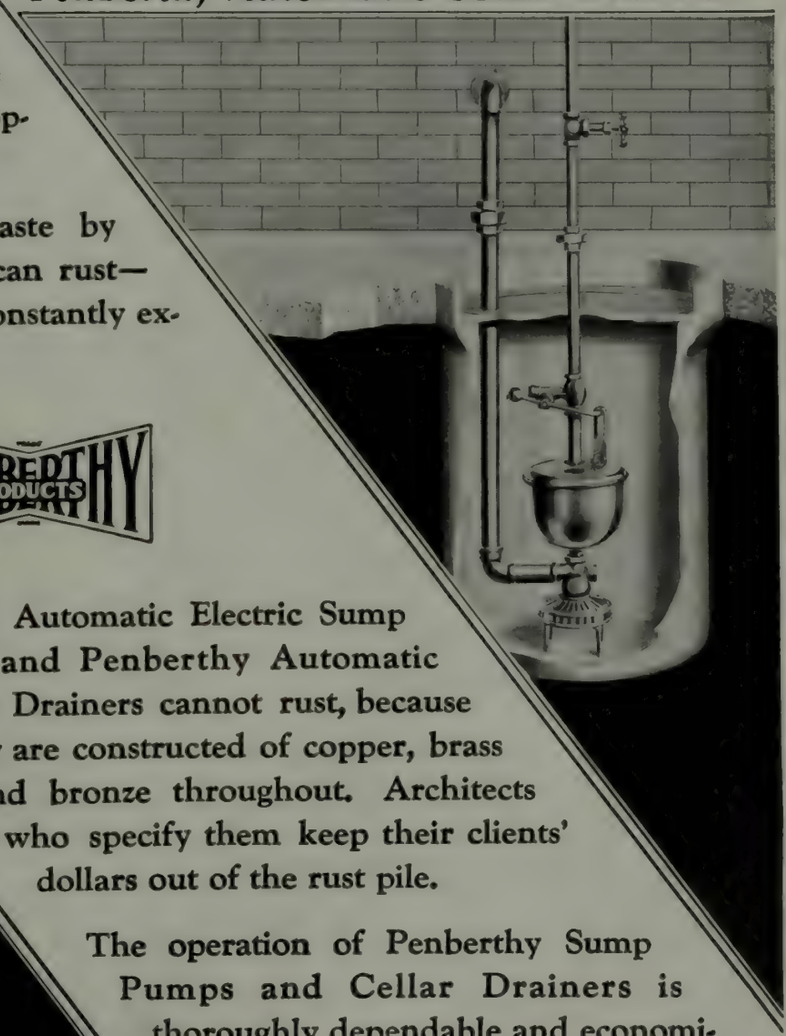
Are you responsible for a part of it?

The annual loss in the United States due to rust is estimated at $600,000,000. This figure is appalling—particularly when you realize that much of the loss is preventable by using equipment made from copper and its alloys.

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ENGINEERING PRODUCTS DIVISION, SECTION A

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See the RCA Centralized Radio Exhibit at the Atlantic City Convention of the RMA during the week of June 2nd.

A REVIEW OF CATALOGUES

RAY-PROOF RUBBER

Scientific light repellent for floors and walls. The story of the discovery and development of X-ray and the weakness of lead and plaster protection from its rays. Description and advantages of ray-proof rubber. Floor and wall treatment installation. Specifications for walls and floors. Stedman Products Company, South Braintree, Mass. 5⅜ x 8 in. 12 pp. Ill.

STRUCTURAL STEEL

Catalogue No. 618. "Standardized Service in Steel for One Story Buildings." Full description of the structural parts. Width, length and height standardization. Side wall construction: solid wall—windows. Roof deckings, ceiling and floor construction. Structural steel frame doors. Steel for airplane hangars. Service in steel. Detailed drawings and Macomber standardizations. The Macomber Steel Company, Canton, Ohio. 8½ x 11 in. 12 pp. Ill.

BOILERS, STEEL

Catalogue 88. Kewanee residence type R boiler for bungalows, homes and smaller buildings. Advantages of steel boilers. Ratings. Detailed drawings, data and measurements for coal-burning and oil-burning boliers. Gas boilers. Specifications. Kewanee Boiler Corporation, Kewanee, Ill. 8½ x 10⅝ in. 12 pp. Ill.

PARTITIONS, SECTIONFOLD AND ROLLING

Construction details; dimensions; doors and hardware. Typical installations. Details and specifications. Advantages. The J. G. Wilson Corporation, 11 East 38th Street, New York City. 8½ x 11 in. 32 pp. Ill.

STORE FRONTS, TERRA COTTA

Description of terra cotta and its advantages for store and store front construction. Color combinations and typical installations. 8½ x 11 in. 16 pp. Ill. Also booklet "Terra Cotta Buildings Superior for Floodlighting." Cost of terra cotta; permanent effectiveness. National Terra Cotta Society, 230 Park Ave., New York City. 8½ x 11 in. 16 pp. Ill.

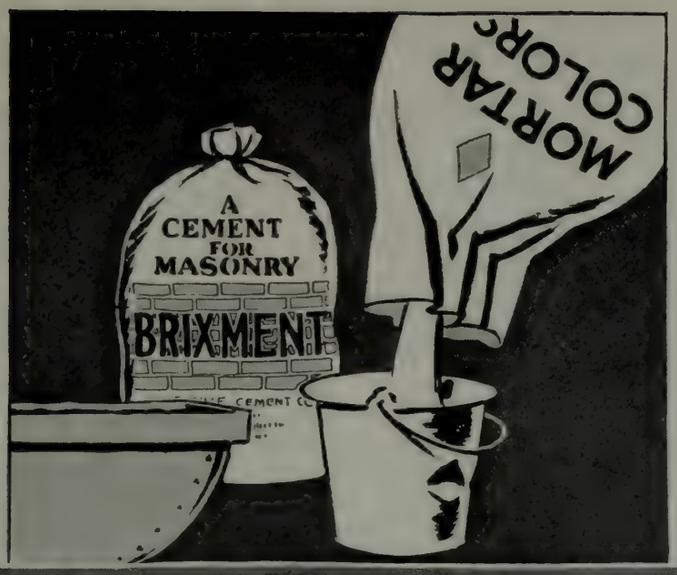
WOOD PANELING

"American Walnut for Interior Woodwork and Paneling." Value of good interior trim; cost of woodwork; specifications of the specimen room. How to obtain walnut woodwork. The figure in walnut. Walnut trim, floors and finishes. Advantages of American walnut. American Walnut Manufacturers' Association, 616 South Michigan Ave., Chicago, Ill. 8⅜ x 10¾ in. 24 pp. Ill.

WINDOWS, STEEL

Detention type windows for hospitals, jails and asylums. Full information and description. Advantages. Details of various types. Specifications. Typical installations. David Lupton's Sons Co., Allegheny Ave. and Tulip St., Philadelphia, Pa. 8¼ x 10¾ in. 12 pp.

(*Continued on page 102*)



PREVENT FADING OF MORTAR COLORS

FADING of mortar colors is usually caused by the presence of strong acids or alkalies in the mortar itself.

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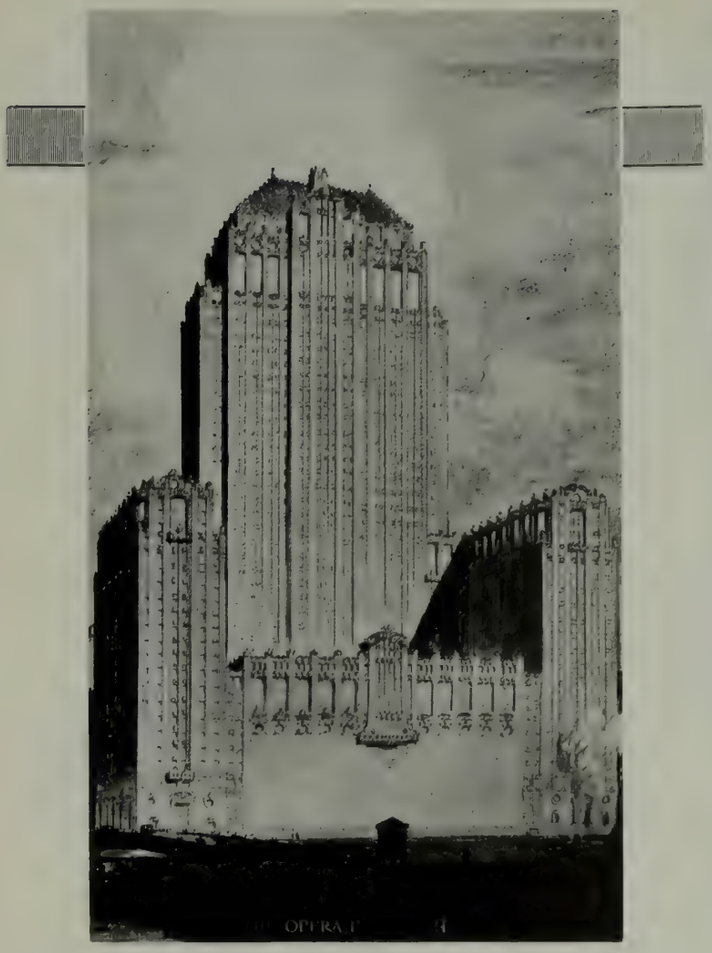
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CEMENT MANUFACTURERS SINCE 1830

BRIXMENT





This is the Civic Opera Building at Chicago

—a notable project for which Graham, Anderson, Probst & White were the architects and John Griffiths & Sons the general contractors.

The services rendered by Robert W. Hunt Company on this building included the estimation of weights for the structural steel work and also both mill and shop inspection of structural steel—of which the total was 27,457 tons.

See Sweet's A4

STEEL AT SHOP AND FIELD
CEMENT—CONCRETE
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Construction details as applied to gable end steel frames, concrete curbs, wood framing, etc. Special features, including low maintenance cost, weatherproofness, resistance to vibration and temperature changes. Typical installations. David Lupton's Sons Co., Allegheny Ave. and Tulip St., Philadelphia, Pa. 8½ x 11 in. Portfolio of 17 plates.

Fire Protection

Complete data for interior fire protection on cabinets, hose racks, fire hose units, Siamese, standpipe systems, fire line valves, fire extinguishers, etc. Description of operation and construction. Dimensions. Detailed drawings and specifications. Typical installations. W. D. Allen Manufacturing Co., 566-570 West Lake Street, Chicago, Ill. 9 x 11½ in. 24 pp. Ill.

Steam Heating, Venturafin

Bulletin No. 9218. Method of heating for floor, wall or ceiling mounting—full information. Description of various types. Heating element; forced heat principle. Piping diagrams. Temperature control. Capacity tables. Chart to determine air volumes. American Blower Corporation, Detroit, Mich. 8½ x 11 in. 24 pp. Ill.

Low Pressure Heating

Complete information is contained in the 15-page catalogue of the H. B. Smith Co., displaying their low pressure steam and hot water heating boilers, radiators and accessories, to meet the requirements of any size installation. The catalogue is replete with detail illustrations and diagrams, explanations, etc., of all features and advantages of their products, and all necessary information for specifications is given. 15 pp. H. B. Smith Co., Westfield, Mass. (This catalogue is in Sweet's for 1930.)

Cooking Ranges

The beauty and utilitarian features of the American Stove Co. gas ranges are interestingly and completely shown in their 10-page catalogue. Color in modern mode is featured and all necessary working information is fully tabulated in simplest form. Coal and wood burning stoves are also among the products of this company. 10 pp. American Stove Co., 925 Chouteau Ave., St. Louis, Mo. (This catalogue is in Sweet's for 1930.)

Incinerators

Washburn & Granger, Inc., have filed their complete catalogue No. 17 of ten pages showing Dean Incinerators in all classes and sizes for the disposal of garbage, refuse, waste, etc.

Details for varied forms and uses are graphically shown, including installations for domestic, commercial, industrial, hospital and miscellaneous uses. Structural features and general adaptability to architects' plans are well illustrated. 10 pp. Washburn & Granger, Inc., 50 Church St., New York City. (This catalogue is in Sweet's for 1930.)

(Continued on page 194)

A Convenience feature of the modern Residence



On the estate of Mr. Monroe Eisner, Red Bank, N. J., are fourteen telephone outlets: eleven in the residence, and one each in the superintendent's cottage, the stables and a detached garage. Built-in conduit connects these outlets and carries the wiring for the telephone system which includes intercommunicating features. The dining-room and breakfast-room outlets are served with a portable telephone.

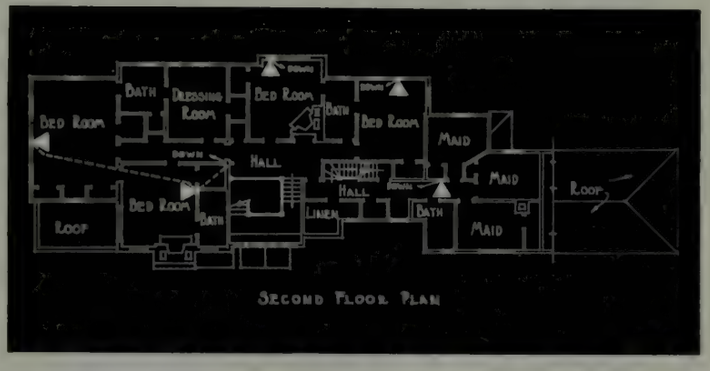
FRED M. TRUEX, Architect,
New York City.

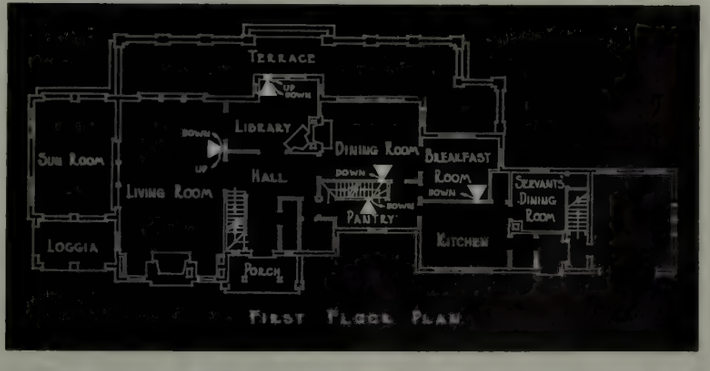
Telephone outlets *throughout* the house

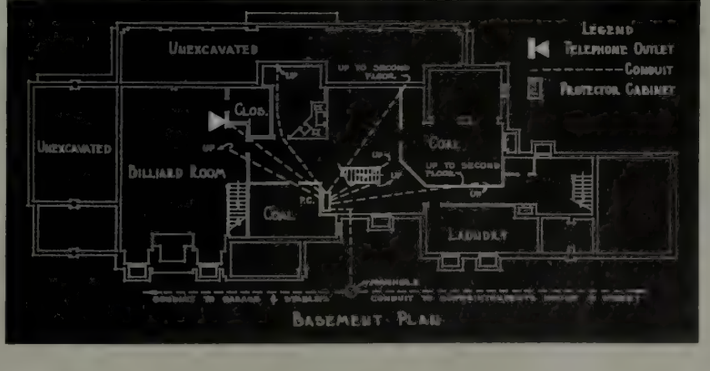
THE TELEPHONE REQUIREMENTS of the modern household are radically different from those of a few years ago. Telephones are needed in many locations . . . living-room, library, dining-room, kitchen or pantry, breakfast nook, garage, game room, bedrooms, servants' quarters . . . wherever, in fact, they will save steps and time, and add to comfort and convenience.

Many architects are meeting this demand for complete telephone convenience by specifying conduit for the telephone wiring in their plans for new and remodeled residences. In this way they provide for telephone outlets in all of the important rooms. The home owner can use just those he desires, and he can readily expand or rearrange the service to meet changing needs. In addition, he can enjoy the improved appearance that results from concealed wiring.

Your local Bell Company will gladly confer with you and your clients in planning the telephone arrangements for all your building projects. There is no charge. Just call the Business Office.







Architects Everywhere Are Turning to These Unique Fountains



Here is an invention that is capturing the attention of architects from coast to coast. Utterly different in principle, the new Century Bubblerhead completely conquers fluctuating water pressure. It banishes forever the unsanitary, inconvenient trickle and eliminates entirely sudden splashing gushes. The Century Automatic Bubblerhead functions with the same definite accuracy every day in the year, assuring the highest degree of practical sanitation.



Eliminates Water Waste

The Century Bubblerhead does not waste a single drop of water. It has only two moving parts and is made of the finest bronze. Precision workmanship and long life are guaranteed. See the new beautiful fountains. There is a model for every need including a complete line of ice cooled fountains for industrial use. We urge you to send for complete information. The Century A.I.A. folder contains the full story of the new Century invention and gives definite specifications of all Century products. Write for it now.

CENTURY BRASS WORKS, Inc.

902 No. Illinois St. Belleville, Illinois



Century SANITARY DRINKING Fountains

Paints and Varnishes

All about painting and varnishing for all building construction and allied uses is told in 30 pages devoted to the Sherwin-Williams Co. catalogue. Selection may be made from complete color charts showing actual finished painted surface appearance and realistic stair effects. Specifications are presented in copy form. Valuable discussions and explanations are given of properties, methods and specific uses, etc. Attractive modern decorative wall treatments are featured as are also the new quick drying lacquers and varnishes. A full line of technical paints is described. The catalogue is not only illustrative in form but extremely instructive in text. 30 pp. Sherwin-Williams Co., 601 Canal Road, Cleveland, Ohio. (This catalogue is in Sweet's for 1930.)

Hardware

The Oscar C. Rixson Company devote 17 pages to their catalogue of floor checks, special hinges, casement hardware, etc. In this catalogue are to be found complete descriptions of single and double acting floor hinges, door stops and holders, ball bearing and friction hinges of special types, casement and transom operators and cremorne bolts, etc., to meet the most exacting requirements. Concise information is given for special use in specifications and for installation. 17 pp. The Oscar C. Rixson Company, Chicago, Ill. (This catalogue is in Sweet's for 1930.)

Safes and Vault Doors

Resistance to burglary and fire by means of baffling devices and formidable construction are imposingly illustrated in the seven pages of the Mosler Safe Co. catalogue. Descriptions, dimensions, specifications and suggestions for adaptation in plan accompany illustrations of safes and vault doors in such manner as to make catalogue selection easy. Automatic safeguards against heat and water damage are featured. 7 pp. Mosler Safe Co., Hamilton, Ohio. (This catalogue is in Sweet's for 1930.)

Greenhouse Construction

Lord & Burnham Company have a six page exposition of complete greenhouse construction. Along with illustrations of all necessary glazing framework and operating devices will be found details for masonry construction, plant beds, heating and ventilating equipment and devices. Small scale drawings of complete greenhouses with adaptations to landscapes are illustrated. Useful complete specifications are given. 6 pp. Lord & Burnham Company. Factories at Irvington, N. Y., Des Plaines, Ill. and St. Catharines, Ont. (This catalogue is in Sweet's for 1930.)

Store Front Construction

The Detroit Show Case Co. require six pages to show the architect how to design, detail and specify for their store front and show window construction. Stock patterns of mullions, muntins and awning bars in their "Desco" make are shown in great variety. Numerous illustrations show incidental masonry and wood construction. Master specifications are complete for all work by them and adjoining work "by others." 6 pp. Detroit Show Case Co., 1670 West Fort Street, Detroit, Mich. (This catalogue is in Sweet's for 1930.)

STORE FRONTS





Dayton's, Milwaukee, Wisconsin. Architect—Hugo V. Miller.

For excellence of workmanship, true reproduction of design and sound construction we advocate the fabrication of store fronts at our factory. A corps of skilled workmen trained by an institution with twenty-five years' experience in store front building is your assurance of satisfaction. Furnished in Bronze, Aluminum Alloy or Copper.

Kawneer
BRONZE
STORE FRONTS

SEE OUR CATALOG IN THE 1930 SWEET'S

THE KAWNEER COMPANY, MANUFACTURERS OF BRONZE STORE FRONTS, WINDOWS AND DOORS

NILES, MICHIGAN. Subsidiary, BERKELEY, CALIF.

BRANCHES

Atlanta, Ga.	Cleveland, O.	Detroit, Mich.	Milwaukee, Wis.	Omaha, Nebr.
Baltimore, Md.	Cincinnati, O.	Kansas City, Mo.	New Orleans, La.	Philadelphia, Pa.
Boston, Mass.	Charlotte, N. C.	Louisville, Ky.	New York, N. Y.	Pittsburgh, Pa.
Buffalo, N. Y.	Chicago, Ill.	Memphis, Tenn.	Niles, Mich.	Utica, N. Y.

SEE OUR EXHIBIT AT ARCHT'S SAMPLE CORP. NEW YORK CITY





Water-proof hinge
Patents applied for.

SEALAIR

WEATHER-PROOF IN ANY WEATHER

When closed, the asbestos-insulated union between sash and frame excludes wind, rain and snow. Even when opened, Sealair affords protection from drafts. The tilt of the sashes diverts the inflow of air, causing it to circulate freely to all parts of the room . . . All sashes can be washed from the inside . . . Furnished in bronze, aluminum alloy or steel.

Send for complete description, specifications and F. S. details.

THE
Kawneer
COMPANY
Niles, Mich.
Subsidiary: Berkeley, Calif.

ALSO WEIGHT-HUNG WINDOWS (Light and Heavy) AND CASEMENTS

CLASSIFIED DIRECTORY OF ADVERTISERS

Alphabetical Index to Advertisers, Page 212

After reviewing advertisements in this issue—use Sweet's Architectural Catalogues for 1930 for catalogue and specification information on the products of the most of the manufacturers.

Acid Proof Chemical Stoneware
Knight, Maurice A.

Acoustical Installation—Armstrong Cork & Insulation Co.
Guastavino, R., Co.

Acoustics
Armstrong Cork & Insulation Co.
Boston Acoustical Eng. Division of Housing Company
Johns-Manville Corp.

Air Compressors
Westinghouse Traction Brake Co.

Air Conditioner
Airway Electric Appliance Corp.
American Blower Co.
Buffalo Forge Co.
Lewis Corporation

Air Washer
Buffalo Forge Co.

Aluminum
Aluminum Co. of America

Anchors—Concrete
Bulldog Floor Clip Co.

Arc Welding—Lincoln Electric Co.

Architectural Supplies
Higgins, Chas. M., & Co.

Artstone—Rackle, George, & Sons Co.

Asbestos—Johns-Manville Corporation

Baking Machinery
Read Machinery Co.

Balances, Sash—See Sash Balances

Basement, Windows—Steel
Detroit Steel Products Co.
Truscon Steel Company

Bathroom Accessories
Parker Charles Company

Beads—Corner Metal
Milwaukee Corrugating Co.
Truscon Steel Company
Wheeling Corrugating Co.

Beams, Angles, Channels, Etc.
Carnegie Steel Company
Jones & Laughlin Steel Corp.

Belts—Dayton Rubber Mfg. Co.

Blackboards—Weber Costello Co.

Boiler and Pipe Covering
Johns-Manville Corporation
Ric-wiL Company

Boilers—American Gas Products Co.
American Radiator Co.
Bryan Steam Corp.
Heggie-Simplex Boiler Co.
Pierce, Butler & Pierce Mfg. Co.
Smith, H. B., Company, The, Inc.

Bolts—Door—Corbin, P. & F.

Brass and Bronze
See "Ornamental Metal"

Brass and Copper
See "Copper and Brass"

Brick—Finzer Bros. Clay Co.

Bridges—Steel—American Bridge Co.

Builders—Stone & Webster, Inc.

Buildings—Steel
Carnegie Steel Company
Nat'l Assoc. of Flat Rolled Steel Mfrs.

Butts—Corbin, P. & F.
Stanley Works

Cabinet Work—Hyde-Murphy Co.

Cabinets—Kitchen
Olean Metal Cabinet Works, Inc.

Cabinets—Medicine—Parker Charles Company

Cabinets—Toilet Paper
Victoria Paper Mills Co.

Casement Operators—Rixson, Oscar C., Company

Casements—Crittall Casement Window Co.
Detroit Steel Products Co.
International Casement Co.
Mesker Bros. Iron Company
Truscon Steel Company

Cast Stone
Cast Stone Institute

Cellar Drainer
Penberthy Injector Co.

Cement—Louisville Cement Company
Medusa Portland Cement Co.
Portland Cement Association
Universal Atlas Cement Co.

Cement White
Medusa Portland Cement Co.

Chain Sash—American Chain Co., Inc.
Detroit Steel Products Co.
Smith & Egge Mfg. Co.

Chairs—Marble, B. L., Chair Co.

Channels—Carnegie Steel Co.
Concrete Engineering Co.
Jones & Laughlin Steel Corp.

Church Memorials
American Seating Company

Clamps—Lock Joint
Hyde-Murphy Co.

Clay Vitrified
Clay Products Association

Clocks, Electric
Landis Eng. & Mfg. Co.

Columns, Porches, Etc.
Hartmann-Sanders Co.
Union Metal Mfg. Co.

Compressors—Air
Westinghouse Traction Brake Co.

Concrete Accelerator
Master Builders Co.
Solvay Sales Corp.

Concrete Construction—Reinforced
American Steel & Wire Company
Concrete Engineering Co.
Truscon Steel Company

Concrete Hardener
Master Builders Co.
Sonneborn, L., Sons, Incorporated
Solvay Sales Corp.

Concrete Piling—See Piling—Concrete

Concrete Ready Mixed
Transit Mixers, Inc.

Concrete Surface Treatment
Master Builders Co.
Solvay Sales Corp.

Conduit for Underground Heating Pipes
Ric-wiL Company

Conduits
Fibre Conduit Co.
Fretz-Moon Tube Co.

Conduo-Base
Conduo-Base Co.

Coping Wall
Clay Products Association

Copper and Brass
Revere Copper & Brass, Inc.

Copper Sheets
Revere Copper & Brass, Inc.

Cork Covering
Armstrong Cork & Insulation Co.

Cork Tile Flooring
Armstrong Cork Company, Custom Floors Dept.

Corkboard
Armstrong Cork & Insulation Co.

Covering—Pipe and Boiler
Armstrong Cork & Insulation Co.
Johns-Manville Corporation
Ric-wiL Company

Dishwasher—Conover Company

Door Closers—Corbin, P. & F.
Norton Door Closer Co.
Sargent & Company

Door and Window Frames
Andersen Frame Corp.





Heavy tubular frame strongly welded

WELDED
BRONZE DOORS for
COMMERCIAL BUILDINGS

The rails and stiles of this door consist of heavy tubular members, the joints of which are strongly welded. The inner edge of the frame is trimmed with shapely mouldings used for securing the center panel. With necessary hardware furnished and applied the complete ensemble presents a unit appropriate for use in the finest commercial buildings.

Send for complete description and F. S. details.

THE
Kawneer
COMPANY
Niles, Mich.
Subsidiary: Berkeley, Calif.

ALSO SHOWER STALLS AND SHOW CASE DOORS



Art Stone Mantelpieces

In All Periods

Reproductions of beautiful old world mantels that recapture perfectly that indefinable attractiveness which gave the originals their charm.

Also Compo Ornaments For Woodwork

Jacobson Mantel & Ornament Company

322 East 44th Street
New York

LOUIS GEIB ARTHUR P. WINDOLPH

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Compound & Pyrono Door Co.
Dahlstrom Metallic Door Co.
Detroit Steel Products Co.
Hamlin, Irving
Hyde-Murphy Co.
International Casement Co.
Kawneer Company
Kinnear Mfg. Co.
Peelle Company, The
Roddis Lumber & Veneer Co.
Sanymetal Products Co.
Security Fire Door Co.
Thorp Fire Proof Door Company
United Metal Products Co.
Weis, Henry, Mfg. Co.
Wilson, J. G., Corp.

Drains—Crampton-Farley Brass Co.
Josam Mfg. Co.

Drawing Inks
Higgins, Chas. M., & Co.

Drives—Cog Belt
Dayton Rubber & Mfg. Co.

Electric Switches
Hart & Hegeman Mfg. Co.
Hubbell Harvey, Inc.

Electrical Equipment
Adam, Frank, Electric Co.
American District Tel. Co.
Bryant Electric Company
Connecticut Tel. & Elec. Corp.
Fibre Conduit Co.
General Electric Company
Graybar Electric Co.
Hart & Hegeman Mfg. Co.
Holtzer-Cabot Electric Co.
Hubbell Harvey, Inc.
Imperial Electric Co.
Lincoln Electric Co.
Westinghouse Electric & Mfg. Co.

Elevator Doors
Peelle Company, The
Security Fire Door Co.
Tyler Company
United Metal Products Co.

Elevator Inclosures
United Metal Products Co.

Elevators
Otis Elevator Company
Tyler Company
Westinghouse Electric Elevator Co.

Enamels
Du Pont de Nemours, E. I., & Co., Inc.
Pratt & Lambert, Inc.
U. S. Gutta Percha Paint Co.

Engineers—Inspection
Hunt, Robert W., Company

Expanded Casings—Milwaukee Corrugating

Expanded Metal
Truscon Steel Company

Fence Post—Steel
American Steel & Wire Co.

Fence—Woven Wood
DuBois Fence & Garden Co., Inc.
Reeves, Robert C., Co.

Fences—American Steel & Wire Co.
Fiske, J. W., Iron Works

Finishing Lime
Ohio Hydrate & Supply Co.

Fire Exit Devices
Vonnegut Hardware Company

Fireplace Construction—Covert, H. W., Co.

Fireplace Unit—Heatilator Co.

Fireproof Doors, Shutters and Windows
Compound & Pyrono Door Co.
Dahlstrom Metallic Door Co.
Detroit Steel Products Co.
Kawneer Company
Mesker Bros. Iron Company
Peelle Company, The
Thorp Fire Proof Door Company
Truscon Steel Company
United Metal Products Co.

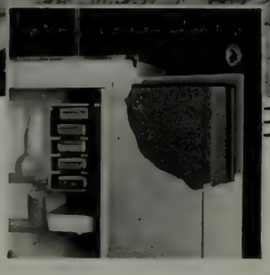


The beautiful home of A. W. Wigglesworth in Kenilworth, Illinois. Exterior walls and second floor ceiling are insulated with Armstrong's Corkboard. Architect, Ralph Stoetzel. Contractor, Edward C. Anderson Co.

Like a Refrigerator

this home is protected against outside temperatures

Corkboard Insulation insures permanent year 'round comfort



To keep foods at just the right temperature, the finest domestic refrigerator has a lining of cork in sides, bottom, and top.

JUST as in a well-built refrigerator . . . corkboard insulation protects the interior of this house on the hottest days. And in the evening, after the sun has beaten madly on the roof all day, second-floor sleeping rooms under cork lined roofs are as cool as those on the first floor.

Next winter too, when cold winds blow lustily, this house, insulated with Armstrong's Corkboard, will be warm and comfortable. In the same way that summer heat is kept out, the warmth of the heating plant is conserved for December comfort. By preventing loss of heat the house is kept warm with a minimum of fuel consumption. A saving, actually large enough to pay the entire cost of insulation, is accomplished in a few years.

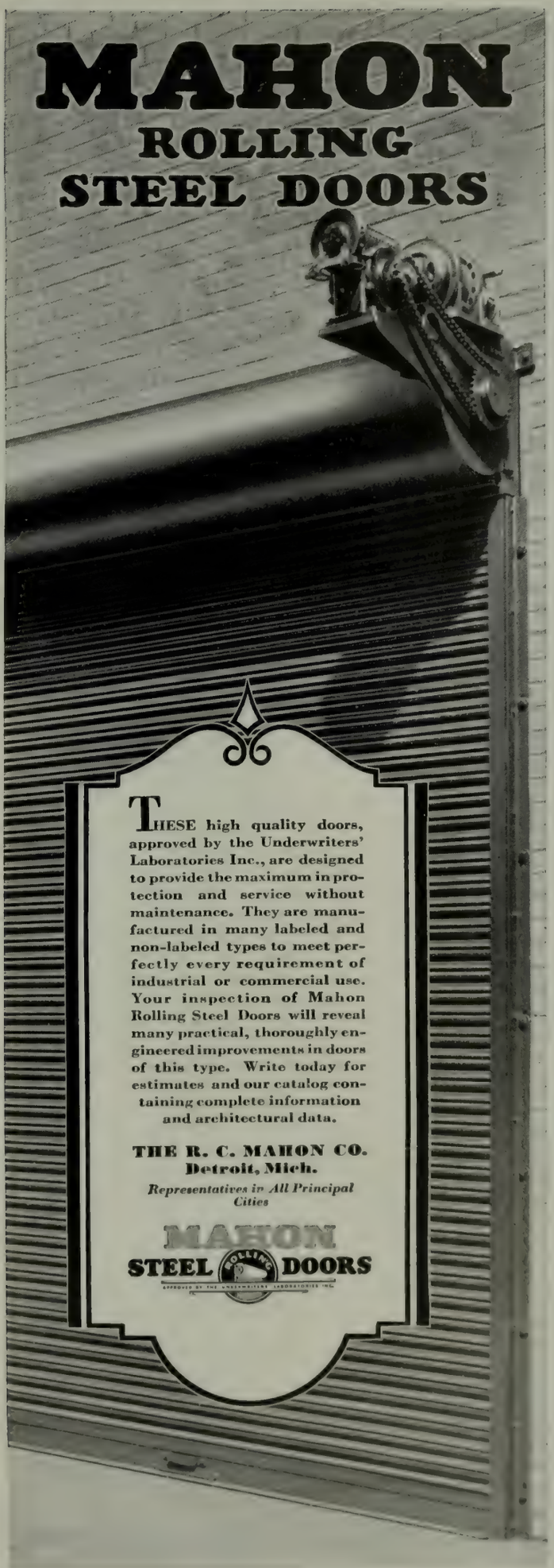
This comfort and economy are permanent benefits in houses insulated with corkboard. Armstrong's Corkboard never decays or disintegrates. When you specify Armstrong's Corkboard you assure the full advantages of insulation throughout the life of the building.

Armstrong's Corkboard is made in the correct thickness to give full protection against outside temperatures, winter and summer. Because it is adequate insulation, corkboard gives the greatest comfort and fuel saving for each dollar invested . . . effects the largest practicable saving of heat in proportion to the cost of the insulation.

You will find valuable information in our illustrated book, "Armstrong's Corkboard Insulation for Walls and Roofs of Buildings." Essential details of modern insulation and the structural strength and fire-retarding values of corkboard are thoroughly covered. We suggest that you write for this book. It will help you in making recommendations and cost estimates. Armstrong Cork & Insulation Company, 901 Concord St., Lancaster, Penna.

Armstrong's Corkboard Insulation

FOR THE WALLS AND ROOFS OF COMFORTABLE HOMES



Fireproofing
See "Concrete Construction," "Covering, Pipe and Boiler," "Fireproof Doors, Shutters and Windows," "Lath-Metal,"

Flashing Wall
Cheney Company

Floor Clips
Bull Dog Floor Clip Co.

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Congoleum-Nairn, Inc.
Stedman Rubber Flooring Company
Wright Rubber Products Co.

Floor Hardeners
Master Builders Co.
Sonneborn, L., Sons, Incorporated
Truscon Laboratories

Floor Plate Steel—Alan Wood Steel Co.
Carnegie Steel Co.

Floor Plates—Alan Wood Steel Co.
Rivet Grip Steel Co.

Flooring
Alan Wood Steel Co.
Armstrong Cork Co. (Flooring Division)
Carter Bloxonend Flooring Co.
Cellized Oak Flooring Co.
Congoleum-Nairn, Inc.
Master Builders Co.
Norton Company
Oak Flooring Mfrs. Assoc. of U. S.
Rivet Grip Steel Co.
Stedman Rubber Flooring Company
Structural Gypsum Corp.
Wright Rubber Products Co.
Zenitherm Company, Inc.

Flooring—Composition
Congoleum-Nairn, Inc.
Zenitherm Company, Inc.

Flooring—Wood Block—Builtup
Carter Bloxonend Flooring Co.

Floors—Fireproof—Alan Wood Steel Co.
Structural Gypsum Corp.

Footlights—Kliegl Bros.

Fountains—Drinking
Century Brass Works, Inc.
Rundle-Spence Mfg. Co.
Taylor, Halsey W.

Furniture—American Seating Co.
Marble, B. L., Chair Co.

Garage Hardware—Corbin, P. & F.

Garden Furniture and Ornaments
Hartmann-Sanders Company

Gas Boilers—American Gas Products Co.
American Radiator Co.
Bryant Heater & Mfg. Co.

Gas Ranges—American Stove Company

Glass—Window
Adamston Flat Glass Co.
American Window Glass Co.
Pittsburgh Plate Glass Co.

Glass Wire—See Wire Glass

Granite—Bates Bros. Seam Face Granite, Inc.
National Bldg. Granite Quarries Assn.

Greenhouses—King Construction Co.

Grilles—Wickwire-Spencer Steel Co.

Gypsum Plaster—See Plaster, Gypsum

Gypsum Slabs—Atlantic Gypsum Products
Structural Gypsum Corp.

Hardware—Corbin, P. & F.
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Rixson, Oscar C., Company
Russell & Erwin Mfg. Co.
Sargent & Company
Soss Manufacturing Company
Stanley Works
Vonnegut Hardware Company
Weis, Henry, Mfg. Co.
Yale & Towne Mfg. Co.

Heat Insulation
Johns-Manville Corporation
Rie-wil Company

Heat Regulator Oven—American Stove Company



Radial Brick Chimney, 200' x 9' Diameter. Erected in 1929 for Empire Oil and Refining Co., Okmulgee, Okla., by Alphons Custodis Chimney Construction Company, New York.

"LIME Is Essential," Chimney Builders Say

MORTAR in tall, radial brick chimneys is subjected to the severest service test encountered in present-day construction.

Structures of this type sway appreciably under high wind pressure and expand and contract under the temperature extremes occurring. Hence to prevent cracking within itself, and shearing or tearing loose from the brick, a chimney mortar must be tough, elastic and adhesive.

These essential qualities are found only in mortars rich in lime. After much experimentation, chimney constructors are in general agreement on the proportions of 2 parts of lime to 1 of cement and 5 of sand. The Alphons Custodis Chimney Construction Company has used this mix for over 35 years with eminently satisfactory results.

Mortars rich in lime are successfully withstanding, without cracking, the extreme conditions imposed in tall chimney service in all sections of the country. This is conclusive evidence that such mortars can be depended upon to give water-tight masonry walls in buildings of all types, where the conditions are less severe. Make lime your principal bonding agent and guard against cracks, leaks and stains marring your work.

Just off the press! "Lime--Its Use and Value in Engineering and Building Construction." Write for your copy today.



Rely on LIME *-tested by time*

NATIONAL LIME ASSOCIATION

An organization of leading lime manufacturers formed to encourage a better appreciation of the economic value of lime in all its uses.

713 Phillips Building » WASHINGTON, D.C.

How gracefully DUBOIS ushers you into this Estate!



NOTHING but a fence that combines rare beauty and distinction could fit into a setting like this.

But Dubois supplies even more. It gives privacy and freedom from any painting or upkeep expense, and it lasts a lifetime.

Dubois lends itself to a wide variety of uses, from framing lovely gardens to screening service yard details or preventing trespass.

Made in France of split, live chestnut saplings closely woven together and bound to horizontal braces with heavy, rust-proof Copperweld wire.

Comes in 5 foot sections, in 5 heights, 3′ 10″, 4′ 11″, 6′ 6″, 8′ and 10′, with quaint gates to match. It is moderate in cost.

A new album for architects will be mailed on request.

Dubois Fence & Garden Co., Inc., 101 Park Avenue, New York.

DUBOIS THE ORIGINAL **Woven Wood Fence**

Trade Mark Reg. U. S. Pat. Off. MADE IN FRANCE

Heating Apparatus
Aerofin Corporation
Air-Way Electric Appliance Corp.
American Blower Co.
American Gas Products Corp.
American Radiator Company
Bryan Steam Corp.
Bryant Heater & Mfg. Co.
Buffalo Forge Co.
Dunham, C. A., Company
Heatilator Co.
Heggie-Simplex Boiler Co.
Johnson, S. T., Co.
Marsh, J. P. & Co.
Nash Engineering Company
Nelson, Herman, Corp.
Peerless Unit Ventilation Co., Inc.
Pierce, Butler & Pierce Mfg. Co.
Richmond Radiator Co., Inc.
Roberts-Gordon Appliance Corp.
Robertshaw Thermostat Co.
Smith, H. B., Company
Sturtevant, B. F., Co.
Williams Oil-o-matic Heating Corp.

Hinges—Gravity
Sanymetal Products Co.

Hinges—Invisible
Soss Manufacturing Company

Humidifier
Lewis Corporation

Insulation—Armstrong Cork & Insulation Co.
Cabot Samuel, Inc.
Flax-li-num Insulating Co.
National Gypsum Co.
U. S. Mineral Wool Co.

Interior Communication System
Automatic Electric Co.
Connecticut Tel. & Elec. Corp.
Holtzer-Cabot Electric Co.

Kitchen Units
Conover Company
International Nickel Co.
Olean Metal Cabinet Works, Inc.

Lath—Metal—American Steel & Wire Co.
Milwaukee Corrugating Co.
Truscon Steel Company
Wheeling Corrugating Co.

Laundry Chutes—Pfaulder Co.

Lighting Control—Theatre
Adams, Frank, Electric Co

Lighting Equipment
Belson Mfg. Co.
Graybar Electric Co.
Kliegl Bros.
Landis Eng. & Mfg. Co.
Pearlman, Victor S., & Co.
Smyser-Royer Company
Westinghouse Electric & Mfg. Co.

Lime—Kelley Island Lime & Transport Co.
National Mortar & Supply Co.
Ohio Hydrate & Supply Co.
National Lime Association

Limestone—Indiana Limestone Company
Victor Oolithic Stone Co.

Linoleum
Armstrong Cork Company, Custom Floors Dept.
Congoleum-Nairn, Inc.

Lockers—Steel
Nat'l Assoc. Flat Rolled Steel Mfrs.

Locks—Corbin, P. & F.
Norwalk Lock Co.
Russell & Erwin Mfg. Co.
Sargent & Company
Yale & Towne Mfg. Co.

Lumber—See Woods

Mail Chutes—Cutler Mail Chute Co.

Mantels—Artificial Stone
Jacobson Mantel & Ornament Co.

Marble—Georgia Marble Company
Vermont Marble Co.

QUIET ... *please* ...



MODERN hospitals need acoustical treatment to deaden the sound of voices and footsteps in corridors. To absorb the noise of slamming doors and rattling dishes. To quiet the disturbing sounds from out of doors. Acoustex does this, and in doing so promotes rest and recovery.

Acoustex eliminates the depressing monotony and glare commonly associated with walls and ceilings of hospital rooms and corridors because it comes finished in cheerful colors to your own specifications. The texture of Acoustex is restful to the eye. It can be cleaned or refinished without appreciable effect on its acoustic qualities. Acoustex is incombustible. Its use involves no fire hazard. Tested by years of successful installations.

BOSTON ACOUSTICAL ENGINEERING DIVISION
of HOUSING COMPANY
40 CENTRAL STREET, BOSTON, MASS.

Acoustex erectors are located in principal cities . . . Ask for specifications and details on the use and application of Acoustex . . . or write us direct.

ACOUSTEX

The *Decorative* Sound Absorbent

ACOUSTEX offers you . . .

An acoustic material which is a finish beautiful in itself . . . tinted to your specifications . . . unusually high coefficient of sound absorption . . . easily vacuum cleaned and redecorated . . . made of incombustible wood fibre . . . tested through years of successful installations . . . furnished in tiles from 6″ x 12″ to 12″ x 24″ and large sheets two feet wide and up to ten feet in length . . . three thicknesses available to meet all absorption requirements:



ACOUSTEX 60—1 inch thick
*Absorbs more than 60% of the incident sound

ACOUSTEX 70—1½ inches thick
*Absorbs more than 70% of the incident sound

ACOUSTEX 80—2 inches thick
*Absorbs more than 80% of the incident sound

*1024 vibrations per second.

Boston Acoustical Engineering Division of Housing Company, 40 Central St., Boston, Mass. R-6
Please send Specifications and Details on the Use and Application of Acoustex for our acoustic file.

Name

Address

THE new Peoria plant of the Caterpillar Tractor Co. (The Austin Co., architects: Fred Harber's Sons, contractors) is an excellent example of present-day use of RACKLE ARTSTONE on large undertakings of every kind. Employed as trim and to harmonize with and relieve brick or stone, it is both inexpensive and also appropriate for any type of building—from an exquisitely designed church to the more utilitarian factory building.



Our catalogue is in Sweet's—pages A 526-527

THE GEORGE RACKLE & SONS COMPANY
CLEVELAND, OHIO
Established 1870

RACKLE ARTSTONE

Memorials—Church
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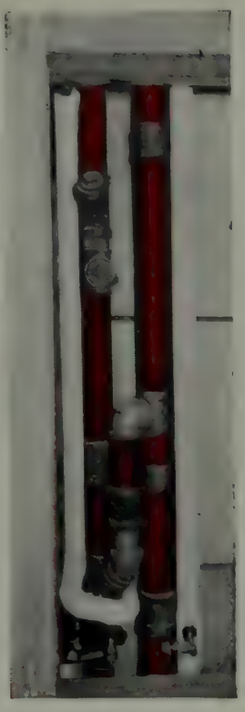
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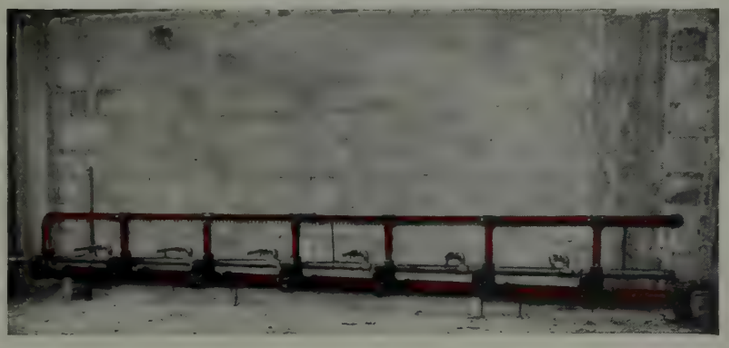
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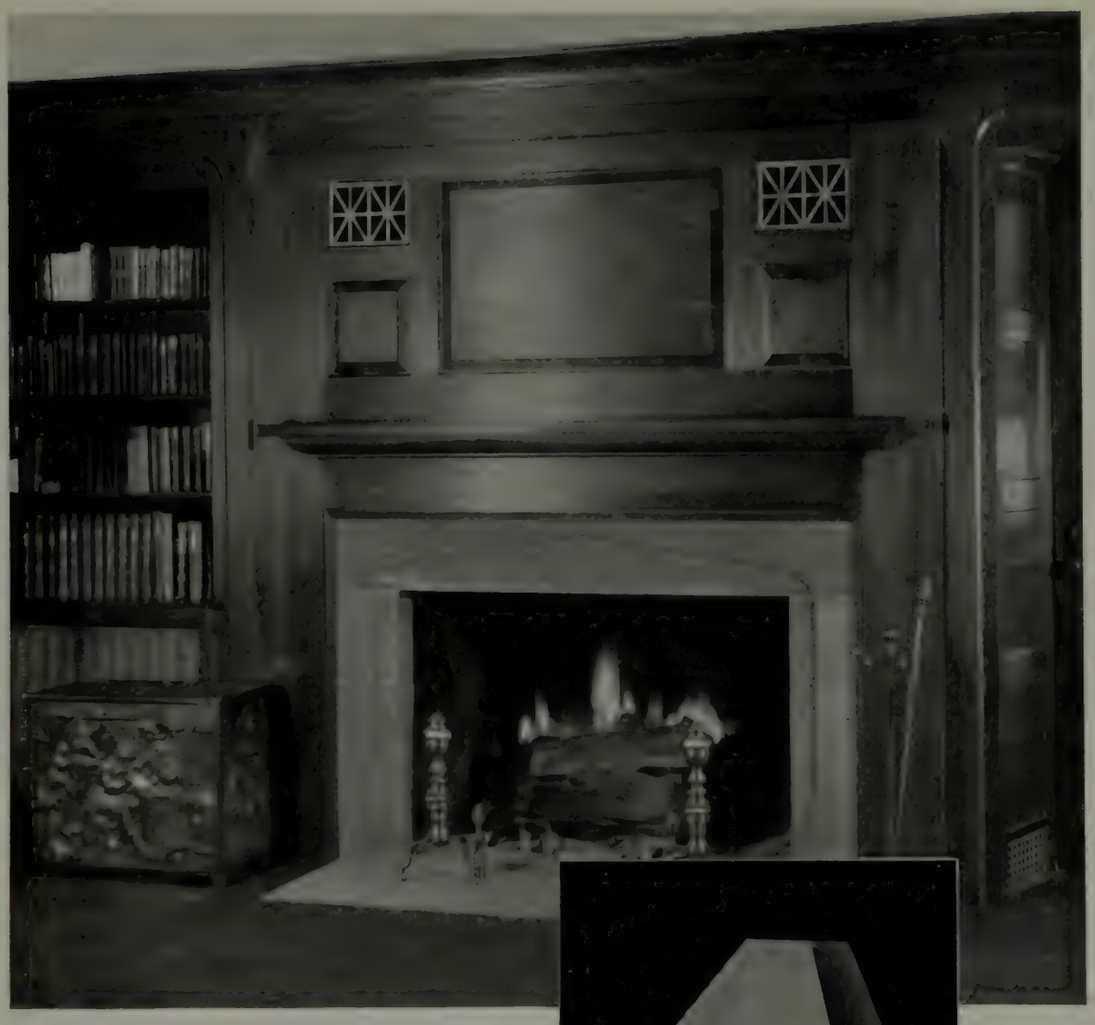
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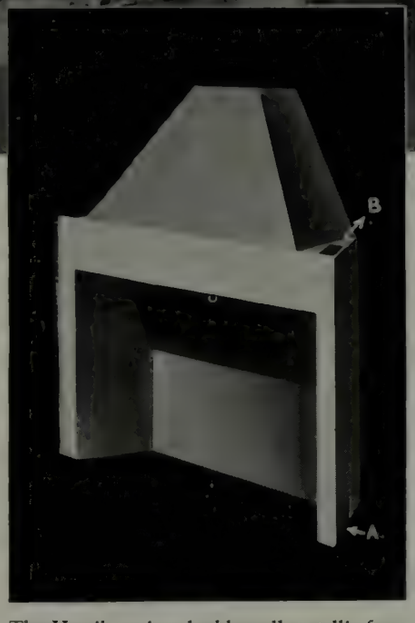
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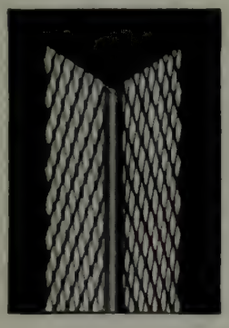
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Copper Alloy Steel



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OAK FLOORING advertising is being continued on an increased scale during 1930. Look for our advertisements in *"House and Garden," "House Beautiful," "Good Housekeeping," "Better Homes and Gardens," "The Literary Digest," "Ladies' Home Journal" and "Small Home."*

THIS MASTER TRADE-MARK *is stamped on the under side of all Oak Flooring produced by members of the Oak Flooring Manufacturers Association of the United States. It is complete protection for you. Every piece is air seasoned and kiln dried, then milled, and thoroughly inspected and accurately graded, insuring uniformly high quality.*



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